



South High Community School

170 Apricot Street, Worcester, MA 01603



Final Bid Package

Volume III of IV – Div. 2 – 14

January 31, 2019

MSBA

Massachusetts School Building Authority
40 Broad Street, Suite 500, Boston, MA 02111

OWNER

City of Worcester, MA
City Hall, 455 Main Street, Worcester, MA 01608

OPM

Heery International
80 Blanchard Road, Suite 108, Burlington, MA 01803

DESIGNER

Lamoureux Pagano & Associates, Inc.
108 Grove Street, Suite 300, Worcester, MA 01605

Prepared by:



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ASBESTOS REMEDIATION

PART I - GENERAL

1.1 GENERAL PROVISIONS

- A. General Conditions, Supplementary Conditions and applicable parts of Division 1 form a part of this specification and the Contractor shall consult them in detail for instructions.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 RELATED WORK UNDER OTHER SECTIONS

- A. Environmental Procedures.
- B. Indoor Air Quality Requirements.

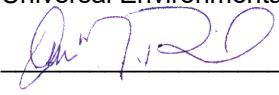
1.3 DESCRIPTION OF WORK:

- A. The work includes the complete removal and disposal of all asbestos containing materials (ACM) as indicated in Part 3 of this Section.
- B. The CM at Risk Contractor shall retain the services of a Massachusetts licensed Asbestos Contractor to perform all required services. The Asbestos Contractor shall include in his scope of work all required services included in Part 3.

1.4 POTENTIAL ASBESTOS HAZARD & DEBRIS

- A. In the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified ACM they must take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state and local agencies.
- B. If the Asbestos Contractor fails to comply with the requirements of the specifications, the Industrial Hygienist may present a written stop of work order. The Asbestos Contractor must immediately and automatically stop all work until authorized in writing by the Industrial Hygienist to commence work. All costs related to delays shall be at the Asbestos Contractor's expense.

1.5 DEFINITIONS

- A. Abatement: Procedures to control fiber release from ACM. Includes encapsulation, enclosure, and removal.
- B. Air Monitoring: The process of measuring the fiber content of a specific volume of air in a stated period.
- C. Asbestos: The name given to several naturally occurring hydrated mineral silicates that possess a unique crystalline structure are incombustible and are separable into fibers. Asbestos includes Chrysotile, Crocidolite, Amosite, Anthophyllite, and Actinolite.
- D. ACM: Any material containing more than 1% or greater by weight of asbestos of any type or mixture of types. State laws may vary in their definition of asbestos containing material.
- E. Critical Barrier: A solid, asbestos impermeable partition erected to constitute a work area closure; the outer perimeter of an asbestos work area, usually erected across corridors or other open spaces to complete containment.
- F. Designer: Commonwealth of Massachusetts licensed Designer Ammar Dieb, Universal Environmental Consultants (AD-900326) expiring 3/2019.


- G. Enclosure: All herein specified procedures necessary to complete enclosure of all ACM behind airtight, impermeable, permanent barriers.
- H. Friable Asbestos Material: Material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
- I. HEPA Filter: A High Efficiency Particulate Absolute (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in length.
- J. Industrial Hygienist: An industrial hygienist certified in the Commonwealth of Massachusetts to perform project monitoring and air sampling.
- K. Removal: All herein specified procedures necessary to strip all ACM from the designated areas and to dispose of these materials at an acceptable site.
- L. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
- M. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

- N. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water, and by afterwards disposing of these cleaning tools as asbestos contaminated waste.
- O. Work Area: Any area indicated on the Drawings as asbestos abatement areas or as areas containing friable asbestos material.
- P. Worker Decontamination Enclosure System: A decontamination enclosure system for workers, typically consisting of a clean room, a shower room, and an equipment room.

1.6 ASBESTOS CONTRACTOR USE OF PREMISES

- A. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary, obtain and pay for such storage off site.
- B. Secure all openings of the building at the end of each shift at no additional cost to the Owner.

1.7 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. Provide a full time Site Supervisor with all appropriate state licenses, experienced in administration and supervision of asbestos abatement projects including Work practices, protective measures for building and personnel and disposal procedures. This person is the Competent Person as required by 29CFR 1926 for the Asbestos Contractor and is the Asbestos Contractor's representative responsible for compliance with all applicable federal, state and local regulations. This person must have completed a course at an EPA Training Center or equivalent certificate course in asbestos abatement procedures, have had a minimum of two years on the job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. The Site Supervisor must be certified by the Commonwealth of Massachusetts.
- B. Asbestos Contractor shall provide proof of such certification to the Designer not less than 10 working days (Document Submission Date) prior to commencing any Work. The accredited Supervisor must always be at the Work site while Work is in progress.

1.8 SPECIAL REPORTS

- A. Except as otherwise indicated, submit special reports directly to the Industrial Hygienist within one day of occurrence requiring special report, with copies to all others affected by the occurrence.

- B. When an event of unusual and significant nature occurs at the site (examples: failure of negative pressure system, rupture of temporary enclosures, unauthorized entry into work areas), prepare and submit a special report listing date and time of event, chain of events, response by Contractor's personnel, evaluation of results, and similar pertinent information. When such events are known or predictable in advance, advise the Industrial Hygienist in advance at earliest possible date.
- C. Prepare and submit special reports of significant accidents, at the site and anywhere else work is in progress related to this project. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss.

1.9 NOTIFICATIONS

- A. Secure all permits related to asbestos removal, hauling, and disposition and provide timely notification as may be required by federal, state and local authorities including the Health department. Notify the Regional Office of the United States Environmental Protection Agency (USEPA) in accordance with 40 CFR 61.22 (d) (1) and provide copies of the notification to the Designer and the State Environmental Regulatory Agency not later than the Document Submission Date.
- B. No later than the Document Submission Date, notify the local fire and police department, in writing, of proposed asbestos abatement Work. Advise the fire department of the nature of the asbestos abatement Work, and the necessity that all firefighting personnel who may enter the Work site in the case of fire wear self-contained breathing apparatus. Provide one copy of the notices to the Designer prior to commencing the project.
- C. Submit proof to the Designer that all required permits, site location, and arrangements for transport and disposal of ACM have been obtained.

1.10 PERMIT AND COMPLIANCE

- A. The Asbestos Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.
- B. The Asbestos Contractor shall submit to the Industrial Hygienist the plan for managing the waste including all collection, storage, disposal and decontamination practices/waste disposal.
- C. The Asbestos Contractor must maintain current certificates of training, licenses or registrations pursuant to OSHA, MADEP and EPA regulations for all Work related to this Project, including the removal, handling, transport, and disposal of hazardous and industrial waste.
- E. The Asbestos Contractor shall be prepared to obtain an EPA ID number if so directed by the Industrial Hygienist.

1.11 SAFETY COMPLIANCE

- A. Comply with laws, ordinances, rules, and regulations of federal, state, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials.
- B. Comply with the applicable requirements of the current issue of 29CFR 1926.1101 and 40CFR 61, Subparts A and B.

1.12 PERSONNEL PROTECTION

- A. Prior to commencement of work, workers shall be instructed in and shall be knowledgeable of the hazards of asbestos exposure; use and fitting of respirators; use of showers; entry and exit from work areas, and all aspects of work procedures and protective measures.
- B. All abatement workers shall receive training and shall be accredited as required by 40 CFR 763.90(g). Training and accreditation shall be in accordance with 40 CFR 763, Appendix C to Subpart E. Training shall also be provided to meet the requirements of OSHA Regulations contained in 29 CFR 1926.
- C. Prior to the start of work, the Asbestos Contractor shall provide medical examinations for all employees in accordance with 29CFR 1926.1101 (m). All employees hired by the Asbestos Contractor after start of work shall have medical examinations in accordance with this paragraph before being put to work.
- D. Maintain complete and accurate records of employee's medical examinations, during employment and make records of the required medical examinations available for inspection and copying to: The Assistant Secretary of OSHA, the Director of The National Institute for Occupation Safety and Health (NIOSH), authorized representatives of either of them, and an employee's physician upon the request of the employee or former employee.
- E. Provide personnel exposed to airborne concentrations of asbestos fibers with fire retardant disposable protective whole-body clothing, head coverings, gloves, and foot coverings. Provide gloves to protect hands. Make sleeves secure at the wrists and make foot coverings secure at the ankles using tape. Asbestos Contractor shall require and monitor the use of complete protective clothing. A competent person designated by the Asbestos Contractor in accordance with 29CFR 1926.1101 shall periodically examine protective clothing worn by employees in the work area for rips or tears. When rips or tears are detected, they shall be immediately mended or replaced.
- F. Provide goggles to personnel engaged in asbestos operations when the use of a full-face respirator is not required.
- G. Provide all persons with personally issued and marked respiratory equipment approved by NIOSH and OSHA. The appropriate respiratory protection shall be selected according to the most recent Massachusetts regulations.

- H. Once all visible asbestos material has been removed during decontamination, cartridge type respirators will be allowed during the final cleanup provided the measured airborne concentrations do not exceed 0.1 fibers per cubic centimeter. Where respirators with disposable filters are employed, provide enough filters for replacement as required by the worker or applicable regulation.
- I. Select respirators from those approved by the Mine Safety and Health Administration (MSHA), Department of Labor, or the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. All personal wearing negative pressure respirators shall have respirator fit tests within the last six months and signed statements shall be available.

1.13 CODES AND REGULATIONS

- A. Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.
- B. The Asbestos Contractor shall assume full responsibility and liability for the compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal, and protection of Workers, visitors to the site, and persons occupying areas adjacent to the site. The Asbestos Contractor is responsible for providing medical examinations and maintaining medical records or personnel as required by the applicable federal, state, and local regulations.

1.14 REFERENCE STANDARDS

- A. Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Requirements of this Section shall in no way invalidate the minimum requirements of the referenced standards. Comply with the provisions of the following codes and standards, except as otherwise shown or specified. Where conflict among requirements or with this Section exists, the more stringent requirements shall apply.
- B. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) requirements, which govern asbestos abatement work or hauling and disposal of asbestos waste materials.
- C. EPA requirements, which govern asbestos abatement work or hauling and disposal of asbestos waste materials.
- D. DEP and the Massachusetts Department of Labor and Standards (DLS).
- E. EPA requirements which governs 40 CFR 761 (TSCA) regulations.
- F. Regulations for Hazardous Waste Management.

1.15 SUBMITTALS

- A. The Asbestos Contractor must submit one emailed copy of a completed submittal no later than the Document Submission Date. No Work can commence until submittals have been approved.
- B. Submit all required licenses and certification required under MGLC.149 S 44D and 453 CMR 6.00.
- C. Submit a copy of the written respirator program.
- D. Submit manufacturer's certification that vacuums, ventilation equipment, and other equipment required to contain airborne asbestos fibers conform to ANSI Z9.2. Manufacturer's brochures without certifications are not acceptable.
- E. Submit a detailed plan of the Work procedures to be used in the removal of materials containing asbestos. Such plan shall include location of asbestos control areas, decontamination units, layout of decontamination units, location of access routes to asbestos control areas, interface of trades involved in the construction, sequencing of asbestos related Work, disposal plan, type of wetting agent and asbestos sealer to be used, air monitoring, and a detailed description of the method to be employed in order to control pollution.
- F. Submit a plan for emergency actions.
- G. Submit the name, address, and telephone number of the testing laboratory selected for the personal air monitoring of airborne concentrations of asbestos fibers to meet Federal and State OSHA regulations, including Short Term Exposure Limit sampling (STEL). The laboratory must have satisfactorily completed the NIST Proficiency Analytical Testing (PAT) Program and be licensed by the appropriate state agency. Submit the certification that persons counting the samples have been judged proficient by successful completion of the NIOSH 582 course (or equivalent) or be listed in the AIHA Asbestos Analysts Registry (AAR). All OSHA required air monitoring should be done in accordance with the most current NIOSH 7400 method.
- H. Submit the design of the negative pressure system.
 - 1. Number of negative air machines required and the calculations necessary to determine the number of machines.
 - 2. Description of projected airflow within the Work area and methods required providing adequate airflow in all portions of the Work area.
 - 3. Manufacturer's product data and certifications for the machines to be used.
 - 4. Location of pressure differential measurement equipment.
 - 5. Manufacturer's product data on equipment used to monitor pressure differential.
- I. Submit for approval the form of security and safety log, which will be maintained on the project.

- J. Submit written evidence that the landfill to be used for disposal of asbestos is approved for disposal of asbestos by the Department of Environmental Protection.
- K. Submit proof that training requirements as specified in 29CFR 1926.1101 (k) (3) and by appropriate state agencies has been complied with.
- L. Submit a description of the plans for construction of decontamination enclosure systems and for isolation of the Work areas in compliance with this specification and applicable regulations.
- M. Submit a schedule including Work dates, shift time, number of employees, dates of start and completion of all Work, asbestos abatement, inspection and clearance monitoring, each phase of refinishing, and final inspections). Schedule shall be updated with each partial payment request.
- N. Submit copies of all notifications.
- O. Submit copy of asbestos licenses.
- P. Submit written evidence that the landfill to be used for disposal of asbestos is approved for disposal of asbestos by the Department of Environmental Protection and EPA.
- Q. Submit Health and Safety Plan per the requirements of OSHA and other applicable regulations.
- R. Submit once work is complete, all disposal waste shipment records and related documents, closure report for ACM.

1.16 REPORTING

- A. Maintain on site a daily log documenting the dates and time of the following items, as well as other significant events:
 - 1. Minutes of meetings: purpose, attendees, and brief discussion
 - 2. Visitations: authorized and unauthorized
 - 3. Personnel: by name, entering and leaving the Work area
 - 4. Special or unusual events
- B. Documentation with confirmation signature of Industrial Hygienist of the following:
 - 1. Inspection of Work area preparation prior to start of removal and daily thereafter.
 - 2. Removal of waste materials from Work area and transport and disposal at approved site.
- C. Provide two bound copies of this log to the Designer prior to submission of the application for final payment.

1.17 AIR MONITORING

- A. Throughout the entire removal and cleaning operations, air monitoring will be conducted to ensure that the Asbestos Contractor is complying with the EPA and OSHA regulations and any applicable state and local government regulations. The architect will provide an Industrial Hygienist to take air samples at the job site at no cost to the Asbestos Contractor.
- B. The purpose of the air monitoring will be to detect faults in the Work area isolation such as:
 - 1. Contamination of the building outside of the area with airborne asbestos fibers,
 - 2. Failure of filtration or rupture in the negative pressure system,
 - 3. Contamination of the exterior of the building with airborne asbestos fibers.
 - 4. Should any of the above occur the Asbestos Contractor should immediately cease asbestos activities until the fault is corrected! Work shall not recommence until authorized by the Designer.

1.18 AIRBORNE FIBER COUNTS

- A. If any air sample taken outside of the work area exceeds the established, immediately and automatically stop all work. If this air sample was taken inside the building and outside of critical barriers around the work area, immediately erect new critical barriers to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g. wall, ceiling, and floor).
 - 1. Decontaminate the affected area in accordance with the procedures outlined in DECONTAMINATION OF WORK AREA.
 - 2. Respiratory protection shall be worn in affected area.
 - 3. Leave critical barriers in place until completion of work and ensure that the operation of the negative pressure system in the work area results in a flow of air from the balance of the building into the affected area.
 - 4. After certification of visual inspection in the work area, remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area as set forth in WORK AREA CLEARANCE.
 - 5. A final inspection after removal of poly shall be completed by the Asbestos Contractor's Supervisor and the Industrial Hygienist.
- B. The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts. "Airborne Fibers" referred to above include all fibers regardless of composition as counted in the NIOSH 7400 Procedure. If work has stopped due to high airborne fiber counts, air samples will be secured in the same area by the Industrial Hygienist for analysis by electron microscopy. "Airborne Fibers" counted in samples analyzed by Scanning or Transmission Electron microscopy shall be only asbestos fibers, but of any diameter and length. After analysis by electron microscopy the number of "Airborne Fibers" shall be determined by multiplying the number of fibers, regardless of composition, counted by the NIOSH 7400 procedure by a number equal to asbestos fibers counted divided by all fibers counted.

- C. If Electron microscopy is used in accordance with the above paragraph, and if the average of airborne asbestos fibers in all samples taken outside the work area exceeds the base line, then the cost of such analysis will be borne by the Asbestos Contractor, at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plastic Sheet: 9-mil minimum thickness, unless otherwise specified, in sizes to minimize the frequency of joints.
- B. Tape: Capable of sealing joints of adjacent sheets of plastic and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under dry and wet conditions, including use of amended water. Provide tape, which minimizes damage to surface, finishes.
- C. Cleaning Materials: Use materials recommended by manufacturer of surface to be cleaned. Use cleaning materials only on surfaces recommended by the cleaning material manufacturer.
- D. Impermeable Containers: Suitable to receive and retain any asbestos containing or contaminated materials until disposal at an approved site. Containers must be both air and watertight.
- E. Provide metal or fiber drums with tightly fitting lids and double thickness 6 mil plastic bags capable of being sealed and sized to fit within the drums.

2.2 EQUIPMENT

- A. Supply the required number of asbestos air filtration units to the site in accordance with these specifications. Each unit shall include the following:
 - 1. Cabinet: Constructed of steel or other durable materials able to withstand damage from rough handling and transportation. Cabinet shall be factory sealed to prevent asbestos containing dust from being released during use, transport, or maintenance. Access to and replacement of all air filters shall be from intake end. Unit shall be mounted on casters or wheels.
 - 2. Fans: Rate capacity of fan according to useable air moving capacity under actual operating conditions. Use centrifugal type fan.
 - 3. HEPA Filters: The final filter shall be the HEPA type. The filter media (folded into closely pleated panels) must be completely sealed on all edges with a structurally rigid frame. A continuous rubber gasket shall be located between the filter and the filter housing to form a tight seal.
 - 4. Each filter shall be individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles. Testing shall be in accordance with Military Standard Number 282 and Army Instruction Manual I36-300-I75A. Each filter shall bear a UL 586 label to indicate ability to perform under specified conditions. Each filter shall be marked with the name of the manufacturer, serial number, airflow rating, efficiency and resistance.

5. Prefilters: Prefilters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of prefiltration are required. The first stage prefilter shall be a low efficiency type (e.g., for particles 10 um and larger). The second stage (or intermediate) filter shall have a medium efficiency (e.g., effective for particles down to 5 um). Prefilters and intermediate filters shall be installed either on or in the intake grid of the unit and held in place with special housings or clamps.
6. Instrumentation: Each unit shall be equipped with a Magnehelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed. A table indicating the useable air handling capacity for various static pressure readings on the Magnahelic gauge shall be affixed near the gauge for reference, or the Magnahelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) air delivery at that point. Provide units equipped with an elapsed time meter to show the total accumulated hours of operation.
7. Safety and Warning Devices: The unit shall have an electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter. Units shall be equipped with automatic shutdown system to stop fan in the event of a major rupture in the HEPA filter or blocked air discharge. Indicator lights are required to indicate normal operation, too high a pressure drop across the filters (i.e., filter overloading), and too low of a pressure drop (i.e., major rupture in HEPA filter or obstructed discharge).
8. Electrical Components: Provide electrical components, which are approved by the National Electrical Manufacturers Association (NEMA), and Underwriter's Laboratories (UL). Each unit shall be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet shall be grounded.

2.3 DANGER SIGNS AND LABELS

- A. Display danger signs at each location where airborne concentrations of asbestos fibers may be more than 0.01 fibers/cc. Post signs at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs.
- B. The sign shall also contain a pictorial representation of possible danger or hazard, such as a skull and cross bone, or other suitable warning as approved by the Industrial Hygienist. Sign shall meet the requirements of 29CFR 1926.200. A sample of the signs to be used shall be submitted to the Industrial Hygienist for approval prior to beginning work area preparation.
- C. Affix danger labels to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers.

2.4 PERSONNEL DECONTAMINATION UNIT

- A. Prior to any asbestos abatement work, including placement of plastic on walls that will contact or disturb asbestos containing surfaces, or removal of light fixtures or any items on asbestos containing surfaces, construct a Personnel Decontamination Unit consisting of a serial arrangement of connected rooms or spaces, Changing Room, Shower Room, and Equipment Room.

- B. Build suitable framing or use existing rooms, with the Industrial Hygienist written approval, connected with framed in tunnels if necessary; line with 6 mil plastic; seal with tape at all lap joints in the plastic for all enclosures and decontamination enclosure system rooms. Decontamination units and access tunnels constructed outside shall be constructed with tops made of 5/8" plywood or approved equal. In all cases, access between contaminated and uncontaminated rooms or areas shall be through an airlock. In all cases, access between any two rooms within the decontamination enclosure systems shall be through a curtained doorway.
- C. Provide a changing (clean) room for the purpose of changing into protective clothing. Construct using polyethylene sheeting, at least 6-mil in thickness, to provide an airtight seal between the Clean Room and the rest of the building. Locate so that access to work area from Clean Room is through Shower Room. Separate Clean Room from the building by a sheet polyethylene flapped doorway.
- D. Require workers to remove all street clothes in this room, dress in clean disposable coveralls, and don respiratory protection equipment. Do not allow asbestos contaminated items to enter this room. Require workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.
- E. An existing room may be utilized as the changing room if it is suitably located and of a configuration whereby workmen may enter the Clean Room directly from the Shower Room. Protect all surfaces of room with sheet plastic. Authorization for this shall be obtained from the Industrial Hygienist in writing prior to start of construction.
 - 1. Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in Changing Room.
 - 2. Damp wipe all surfaces twice after each shift change with a disinfectant solution.
 - 3. Provide a continuously adequate supply of disposable bath towels.
 - 4. Provide posted information for all emergency phone numbers and procedures.
 - 5. Provide 1 storage locker per employee.
 - 6. Provide all other components indicated on the Contract drawings.
- F. Provide a completely water tight operational shower to be used for transit by cleanly dressed workers heading for the work area from the changing room, or for showering by workers headed out of the Work Area after undressing in the Equipment Room.
- G. Construct room by providing a shower pan and 2 shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wooden floor in shower pan at elevation of top of pan.
 - 1. Separate this room from the rest of the building with airtight walls fabricated of 6-mil polyethylene.
 - 2. Separate this room from the Clean and Equipment Rooms with airtight walls fabricated of 6-mil polyethylene.
 - 3. Provide showerhead and controls.
 - 4. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
 - 5. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.

6. Arrange so that water from showering does not splash into the Clean or Equipment Rooms.
 7. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the work area.
 8. Provide flexible hose shower head.
 9. Pump wastewater to drain and provide 20 micron and 5-micron wastewater filters in line to drain or waste water storage. Locate filter hose inside shower unit so that water lost during filter changes is caught by shower pan and pumped to exterior filtering system.
- H. Provide equipment room for contaminated area; work equipment, footwear and additional contaminated work clothing are to be left here. This is a change and transit area for workers. Separate this room from the work area by a 6-mil polyethylene flap doorway.
1. Separate this room from the rest of the building with airtight walls fabricated of 6-mil polyethylene.
 2. Separate this room from the Shower Room and work area with airtight walls fabricated of 6-mil polyethylene.
- I. Separate work area from the equipment Room by polyethylene barriers. If the airborne asbestos level in the work area is expected to be high, add an intermediate cleaning space between the Equipment room and the work area. Damp wipe clean all surfaces after each shift change.

2.5 EQUIPMENT DECONTAMINATION UNITS

- A. In areas with only one access, it may be impossible to utilize a separate Equipment Decontamination Unit. In this case, all equipment and waste materials will exit through the Personnel Decontamination Chambers.
- B. When two accesses to the work area are available, provide an Equipment Decontamination Unit consisting of a serial arrangement of rooms, Clean Room, Holding Room, Wash Room for removal of equipment and material from work area. Do not allow personnel to enter or exit work area through Equipment Decontamination Unit.
- C. Provide an enclosed shower unit located in work area just outside Wash Room as an equipment, bag and container cleaning station.
- D. Provide Wash Room for cleaning of bagged or containered asbestos containing waste materials passed from the work area. Construct Wash Room of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and located so that packaged materials, after being wiped clean can be passed to the Holding Room. Separate this room from the work area by flaps of 6-mil polyethylene sheeting, or rigid self-closing doors.

- E. Provide Holding Room as a drop location for bagged ACM passed from the Wash Room. Construct Holding Room of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and located so that bagged materials cannot be passed from the Wash Room through the Holding Room to the Clean Room.
- F. Provide Clean Room to isolate the Holding Room from the building exterior. Construct Clean Room of 2 by 4-inch (minimum) wood framing and polyethylene sheeting, at least 6-mil in thickness and locate to provide access to the Holding Room from the building exterior. Separate this room from the exterior by flaps of 6 mil polyethylene sheeting, or rigid self-closing doors.

2.6 DANGER SIGNS AND LABELS

- A. Provide and display danger signs at each location where airborne concentrations of asbestos fibers may be in excess of 0.01 fibers/cc. Post signs at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Post signs at all approaches to Work areas or areas containing excessive concentrations of airborne asbestos fibers.
- B. The sign shall also contain a pictorial representation of possible danger or hazard, such as a skull and cross bone, or other suitable warning as approved by the Designer. Sign shall meet the requirements of 29CFR 1926.1101 (k) (7).
- C. A sample of the signs to be used shall be submitted to the Designer for approval prior to beginning Work area preparation.

PART 3 - EXECUTION

3.1 SCOPE OF WORK:

It is anticipated that the asbestos abatement project will be performed in one phase. It is the Asbestos Contractor's responsibility to comply with the phasing schedule prepared by the Architect and shall comply with the commencement and completion dates allocated. Changing, decreasing and increasing of phases, size, location and scope of work shall not constitute compensation by the Owner or any of his representatives.

The project monitor(s) will record daily all quantities removed. The Asbestos Contractor will be required to do the same. Both the Asbestos Contractor and the monitor must sign all daily logs. No work will continue until all logs are signed daily to the satisfaction of the Designer and Monitor. At the completion of the total project, should quantities removed were found to be less than the listed below, the Asbestos Contractor will be required to issue a credit to the owner based on unit prices listed in the Unit Price Section 01 22 00 or will be paid at the unit prices should quantities removed were found to be greater than the listed above.

Location	Type of ACM	Approximate Quantities
Throughout	Various Types of Flooring and Mastic Interior Windows	101,000 SF 475 Total

	Duct Sealant	9,500 SF
	Interior Doors with Windows	150 Total
	Wood Fire Doors	15 Total
	Metal Doors	20 Total
	Blackboards/Tackboards	150 Total
	Sinks	25 Total
	Light Fixtures	Unknown
Stage	Fire Curtain	1 Total
Classrooms 124, 136 and 157	Paper/Mastic for Wood Block Floor	5,000 SF
Science Room	Lab Tables	2 Total
Gymnasium	Rubber Flooring/Cement	19,000 SF
	Wood Strip Flooring	5,500 SF
Rooms 292/293	Rubber Flooring/Cement	1,200 SF
Exterior	Windows	290 Total
	Transite Sewer Pipe	1,000 LF

Specific Notes:

1. It's the Asbestos Contractor's responsibility to inspect the site and confirm condition prior to the submission of his/her bid package. It is also the Asbestos Contractor's responsibility to review the demolition drawings, notes and phasing configurations. The Asbestos Contractor must include in his/her bid the entire scope of work listed above. Means and methods of removal will be at the discretion of the Asbestos Contractor with prior approval by the onsite monitor and designer. The Asbestos Contractor must comply with the most recent DEP regulations.
2. Perform all required demolition, disconnection and retain the services of electricians and plumbers if needed to perform the work at no additional cost to the owner.
3. Remove and dispose as ACM of all types/layers of flooring materials, including but not limited to multiple layers of vinyl floor tiles, linoleum, carpet, resilient baseboard, stair treads, transition strips, leveling compound, cementitious leveler and mastic under all above items (Flooring Material). Removal must be done which leave substrate smooth (in similar condition to that which existed prior to Mastic application). Use of Chemicals will be permitted. Once all mastic has been removed, the Asbestos Contractor shall shot blast the concrete floors. Should wood flooring is present the Asbestos Contractor shall remove the wood flooring. The Asbestos Contractor will be required to disconnect services (gas, water) and remove and dispose of fixed objects to access to ACM. Should ACM found underneath objects not previously removed, the Asbestos Contractor will be required to perform abatement at no additional cost to the owner for re-mobilization. Multiple layers are found. Quantities listed above are for flooring surfaces. The Asbestos Contractor shall remove all layers at no additional cost to the owner. The Asbestos Contractor may obtain a waiver from the DEP to shot blast the mastic instead of chemicals at no additional cost to the Owner.
4. Remove and properly dispose of interior windows, interior wood/metal doors with framing caulking and interior wood doors including but not limited to windows, doors, glass, glass blocks, transom, caulking and all related attachments. Caulking was found to contain asbestos and assumed or found to contain >1 ppm of PCB's.

5. Remove and dispose as ACM of blackboards, chalkboard, tack board, marker board, display boards, Cementitious wood fiberboard including frame, wood strapping fasteners and ACM glue daub and metal framed chalkboard found behind the wooden chalkboard.
6. Remove and properly dispose of all light fixtures. Tubes were assumed to contain mercury and ballasts to contain PCB's.
7. Remove and dispose as ACM of wood fire doors.
8. Lower, remove and dispose as ACM of the duct sealant. Quantity listed above is for the sealant only. It is the asbestos contractor's means and method to either dispose of the entire duct system or the sealant only at no additional cost to the Owner.
9. Demolish, remove and dispose as ACM of the hardwood and wood block floors, paper and mastic.
10. Remove and dispose as ACM of lab tables.
11. Disconnect, remove and dispose as ACM of sinks.
12. Remove and dispose as ACM of the fire curtain.
13. Remove and dispose of the wood strip flooring, paper and mastic.
14. Remove and properly dispose of the rubber flooring and related system. Remove and dispose of a minimum of 2-inch-deep of the concrete floor. Rubber was found to contain mercury and assumed to have leached into the concrete flooring. Testing will be performed to determine if additional concrete will be needed to be removed. If needed remove another 2 inches of the concrete flooring at no additional cost to the owner. It is the Contractor's responsibility to perform required characterization prior to disposal at no additional cost to the owner.
15. Remove and properly dispose of all windows, curtain walls system, including but not limited to screens, windows, doors, metal panels, glass, glass blocks, frames, sash, casings, sills, louvers, unit vents grille, shims, fasteners, anchors, sealant, flashing, etc. Caulking (Framing and Glazing) was found to contain asbestos and assumed to contain >1 ppm of PCB's.
16. Remove and dispose as ACM of transite and ACM insulated pipe and debris that might be found during excavation/demolition. The Site/Demolition Contractor will perform excavation as needed to expose the pipe. The Asbestos Contractor will be required to perform additional excavation (if needed) to remove the ACM.

3.2 JOB CONDITIONS

- A. Do not commence asbestos abatement work until:
 1. Arrangements have been made for disposal of waste at an acceptable site. Submittal shall be made no later than the Document Submission Date.
 2. Arrangements have been made for containing and disposal of wastewater resulting from wet stripping or filtering through a 5-micron filter.
 3. Pre-clean all areas prior to performing the work.
- B. All materials resulting from abatement work, except as specified otherwise shall become the property of the Asbestos Contractor and shall be disposed of as specified herein.

3.3 INSPECTION AND PREPARATION

- A. Examine the areas and conditions under which asbestos will be abated and notify the Industrial Hygienist in writing of conditions detrimental to the proper and timely completion of the work.

- B. Before any work commences, post danger signs in and around the Work Area to comply with 29CFR 1926.1101 (k) (l) as required by federal and state regulations, and as specified herein.

3.4 WORK PROCEDURE

- A. Perform asbestos related work in accordance with 29CFR 1926.1101 and as specified herein. Use wet removal procedures. Personnel shall wear and utilize protective clothing and equipment as specified herein. Personnel of other trades not engaged in the removal and demolition of asbestos shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection provisions of this specification are complied with by the trade personnel. Provide and post, in the Equipment Room and the Clean Room, the decontamination and work procedures to be followed by workers, as described hereinafter.
- B. Each worker and authorized visitor shall, upon entering the job site, remove street clothes in the Clean Change Room and put on a respirator and clean protective clothing before entering the equipment room or the work area. All workers shall remove gross contamination before leaving the work area. All clothing (coveralls, head covers and boots) shall be removed and properly disposed of before leaving equipment room. With the exception of bathing suites and respirators, the workers shall proceed to the Shower Room. Under the shower, respirators shall be removed and cleaned. Cleaned respirators shall be placed in suitable clean plastic bags and carried by employees to Clean Room. Soap, towels, shall be furnished by the Asbestos Contractor. The Asbestos Contractor shall maintain proper sanitary conditions. The Asbestos Contractor's designated competent person shall insure that these practices are being adhered to.
- C. Following showering and drying off, each worker and authorized visitor shall dispose of towels as contaminated waste and proceed directly to the Clean Change Room and dress in clean clothes at the end of each day's work, or before eating, smoking, or drinking. Before re-entering the work area from the Clean Change Room, each worker and authorized visitor shall put on the applicable respirator and shall dress in clean protective clothing. Contaminated work footwear shall be stored in the equipment room when not in use in the work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste.
- D. Contaminated work footwear shall be stored in the equipment room when not in use in the work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or double bag for use at next site.
- E. Workers removing waste containers from the Equipment Decontamination Enclosure shall enter the holding area from outside wearing a respirator and dressed in clean coveralls. No worker shall use this system as a means to leave or enter the washroom or the work area.
- F. Workers shall be fully protected with respirators and protective clothing immediately prior to the first disturbance of asbestos containing or contaminated materials and until final cleanup is completed. This includes the removal of any equipment in contact with ACM such as lights and HVAC grills.

3.5 PREPARATION OF THE WORK AREA

- A. Seal off the work area by sealing large openings such as open doors, elevator doors, and passageways with a critical barrier. The critical barrier shall constitute the outermost boundary of the asbestos abatement project work area. Plastic sheeting on open framing is not a suitable critical barrier. Critical barriers may be erected of a suitable solid construction material such as plywood, sheet-rock, gypsum board, or other related materials.
- B. Prior to any asbestos abatement work, clean the proposed work areas using HEPA filtered vacuum equipment and wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters will not be permitted. Dispose of all cloths, which are used for cleaning as contaminated waste.
- C. Place all tools, scaffolding, staging, necessary for the work in the area to be isolated prior to erection of plastic sheeting temporary enclosure.
- D. Shut down electric power. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements. Provide 24-volt safety lighting and provide ground-fault interrupter circuits as power source for lights and electrical equipment.
- E. Seal off all openings, including but not limited to corridors, doorways, windows, skylights, ducts, grills, diffusers, and any other penetrations of the work areas, with 6-mil plastic sheeting and sealed with tape.
- F. Prior to any abatement activities seal all floor and ceiling openings or penetrations that have not already been sealed. This includes penetrations through ceiling and floor slabs, both empty holes and holes accommodating items such as cables, pipes, ducts, conduit and expansion joints in floors and wall and floor slab assemblies.
- G. Use combination fire stop foam and fire stop sealant equivalent to Dow Corning Fire Stop Foam and Dow Corning Fire Stop Sealant. Material shall be applied in accordance with manufacturer's recommendations.
- H. Maintain emergency and fire exits from the work areas, or establish alternative exits satisfactory to the local fire officials. Coordinate work with local fire and police departments, and Industrial Hygienist.
- I. Shut down and isolate heating, cooling, ventilating air systems in the contaminated areas to prevent contamination and fiber dispersal to other areas of the structure. During the work, seal vents within the work area with solid barriers, such as plywood and tape and plastic sheeting, or as indicated on the drawings.
- J. Remove all HVAC system filters. Pack disposable filters in sealable double 6 mil plastic bags for burial in the approved waste disposal site; replace with new filters after final cleanup. Wet clean permanent filters; reinstall after final cleanup.

- K. Before work is begun, clean all items, which can be removed without disrupting the asbestos material. Pre-clean movable furniture, [carpeting, clocks, speakers, books, and other objects] within the proposed areas using HEPA filtered vacuum equipment and/or wet cleaning methods as appropriate; remove such objects from work areas to a temporary location as directed by the Industrial Hygienist.
- L. Pre-clean non-removable furniture, book shelving, equipment, heat fans, fire alarms, pipes, ductwork, wires and conduits, lockers, skylights, speakers, and other fixed objects within the proposed work areas, using HEPA filtered vacuum equipment and wet cleaning methods as appropriate prior to abatement activities, and enclose with minimum 6 mil plastic sheeting sealed with tape.
- M. Remove and clean all ceiling mounted objects, such as lights, HVAC grills and other items not previously sealed off, that interfere with asbestos abatement. Use localized water spraying or HEPA filtered vacuum equipment during fixture removal to reduce fiber dispersal.

3.6 MAINTENANCE OF ENCLOSURE SYSTEMS

- A. Ensure that barriers and plastic linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery. Visually inspect enclosures at the beginning of each work period.
- B. Use smoke methods to test effectiveness of barriers when directed by the Industrial Hygienist.

3.7 CONTROL ACCESS:

- A. Permit access to the work area only through the Decontamination Unit. All other means of access shall be closed off, warning signs displayed on the clean side of the sealed access.
- B. Large openings such as open doorways and passageways shall be sealed as a critical barrier. The critical barrier shall constitute the outmost boundary of the asbestos abatement work area.
- C. Plastic sheeting on open framing is not a suitable critical barrier. All cracks, seams, and openings in critical barriers shall be caulked or otherwise sealed, so as to prevent the movement of asbestos fibers out.

3.8 ISOLATION OF WORK AREA:

- A. Completely separate the work area from other portions of the building, and the outside by sheet plastic barriers at least 6 mil in thickness, or by sealing with duct tape.

- B. Individually seal all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, and other openings into the work area with duct tape alone or with polyethylene sheeting at least 6-mil in thickness, taped securely in place with duct tape. Maintain seal until all work including work area decontamination is completed. All lighting fixtures shall have had power shut off.
- C. Provide sheet plastic barriers at least 6 mil in thickness as required to completed seal openings from the work area into adjacent areas. Seal the perimeter of all sheet plastic barriers with duct tape.

3.9 COVERING OF CEILING, FLOOR AND WALL SURFACES

- A. Clean all contaminated furniture, equipment, and or supplies with a HEPA filtered vacuum cleaner or by wet cleaning prior to being moved or covered. All equipment, furniture in work area is to be deemed contaminated unless specifically declared as uncontaminated on the Drawings or in writing by the Industrial Hygienist. Clean all surfaces in work area with a HEPA filtered vacuum or by wet wiping prior to the installation of any sheet plastic.
- B. Cover floor of work area with 2 individual layers of clear polyethylene sheeting, each at least 6 mil in thickness, turned up walls at least 12 inches. Form sharp right angle-bend at junction of floor and wall so that there is no radius, which could be stepped on causing the wall attachment to be pulled loose. Duct tape all seams in floor covering. Locate seams in top layer six feet from, or at right angles to, seams in bottom layer. Install sheeting so that top layer can be removed independently of bottom layer.
- C. Remove all general construction items such as cabinets, casework, doors and window trim, moldings, ceilings, trim which cover the surface of the work as required to prevent interference with the work. Clean, decontaminate and reinstall, unless otherwise indicated, all such materials, upon completion of all removal work with materials, finishes, and workmanship to match existing installations before start of work.
- D. Cover all walls in work area with two (2) layers of polyethylene sheeting, at least 6-mil in thickness, mechanically supported and sealed with duct tape. Tape all joints including the joining with the floor covering with duct tape or as otherwise indicated on the Contract documents or in writing by the Industrial Hygienist. There shall be no seams in the plastic sheet at wall to floor joints.
- E. Cover the ceiling in work area with two (2) layers of polyethylene sheeting, at least 6- mil in thickness, mechanically supported and sealed with duct tape. Tape all joints including the joining with the wall covering with duct tape or as otherwise indicated on the Contract documents or in writing by the Industrial Hygienist. There shall be no seams in the plastic sheet at ceiling to wall joints.
- F. If the enclosure barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add affected area to the work area, enclose it as required by this section and decontaminate it as specified herein.

3.10 NEGATIVE PRESSURE

- A. Establish negative pressure in the work area by installation of High Efficiency Particulate Air (HEPA) filter air-purifying devices. Comply with ANSI Z9.2, Local Exhaust Ventilation Requirements. Maintain system in operation 24 hours per day until decontamination of the work area is completed and area has been certified clean by air monitoring tests and visual inspections. Discharge of asbestos fibers to the outside of the building will not be permitted.
- B. Size negative air pressure system(s) to provide a minimum of one air change every 15 minutes for the area under negative pressure. Locate the exhaust unit(s) so that makeup air enters the work area primarily through the decontamination unit and traverses the work area as much as possible. The intent is to provide the air change specified in each work area (room), not just the specified negative pressure. Place the end of the unit or its exhaust duct through an opening in the plastic barrier or wall covering. Seal the plastic around the unit or duct with tape.
- C. The system shall maintain an air pressure differential of minus 0.02 inch of water. Test the negative pressure system prior to any abatement actions to ensure that the 0.02-inch differential is present. The Industrial Hygienist may require the use of ventilation smoke tubes to check the system performance.

3.11 REMOVAL OF ASBESTOS CONTAINING MATERIALS

- A. Thoroughly wet ACM to be removed prior to stripping to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal Encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for water or removal Encapsulant to penetrate material thoroughly. If a removal Encapsulant is used, apply in strict accordance with manufacturer's written instructions.
- B. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
- C. Remove saturated ACM in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Twist neck of bags bend over and seal with minimum three wraps of duct tape. Clean outside and move to wash down station adjacent to material decontamination unit.
- D. For the removal of pipe and joint insulation, the density of asbestos containing pipe covering seldom allows the material to be removed in a completely wet state. However, every attempt should be made to keep the insulation material as wet as possible to prevent release of asbestos fibers.
- E. Cut the cloth covering on the pipe insulation along the top seam to allow wetting of the asbestos insulation. Do not allow the pipe insulation to fall to the ground or adjacent surfaces. Wet the insulation material and immediately place in a double 6 mil, minimum thickness labeled plastic bag.

- F. In certain areas, asbestos pipe insulation will be removed with glove-bags (with prior approval by the Industrial Hygienist).
1. Seal all critical barriers.
 2. Pre-clean if necessary and place one layer of polyethylene under the pipe to be removed.
 3. Negative air machines with HEPA filtration will be used in the area.
 4. Glove bags will be smoke tested.
 5. Place necessary tools into pouch located inside glove-bag. This will usually include: bone saw, utility knife, rags, scrub brush, wire cutters, tin snips and pre-wetted cloth.
 6. Place one strip of duct tape along the edge of the open top slit of glove-bag for reinforcement.
 7. Place the glove bag around section of pipe to be worked on and staple top together through reinforcing duct tape. Next, duct tape the ends of glove-bag to pipe itself, where previously covered with plastic or duct tape.
 8. Place additional layers of tape along the top of the glove-bag to seal the staple holes and to securely support the bag on the pipe.
 9. Fill each bag with 2 inches of water to thoroughly wet the removed insulation.
 10. Attach vacuum hose through port in bag and tape tightly to prevent leakage.
 11. Insert spray nozzle into bag and tape tightly to prevent leakage.
 12. One person places his hands into the long-sleeved gloves while the second person directs garden sprayer at the work.
 13. Use bone saw, if required, to cut insulation at each end of the section to be removed. A bone saw is a serrated heavy gauge wire with ring-type handles at each end. Throughout this process, spray amended water or removal Encapsulant on the cutting area to keep dust to a minimum.
 14. Remove insulation using putty knives or other tools. Place pieces in bottom of bag without dropping.
 15. Using nylon scrub brush, rags, and water scrub and wipe down the exposed pipe.
 16. Wipe down the inside of the bag with the rags. Remove the water nozzle and tape shut.
 17. Encapsulate the exposed ends and cover any exposed ends of pipe insulation with the re-wettable clothe. This shall be done prior to removing the bag.
 18. Place the cleaned tools either into the next glove bag or put into the glove and pulled out. Twist the glove, tape at least twice and cut through the tape. The tools can be dropped into a bucket of water to clean them.
 19. Twist the bag several times and turn on HEPA vacuum to remove the air. Tape the twist several times.
 20. Slip a 6-mil disposal bag under the glove-bag and while running the vacuum sufficiently to collapse the bag, cut the glove-bag off.
 21. Encapsulate all exposed pipe and elbows to lock down any remaining fibers.
 22. Remove disposable suits and place these into bag with waste.
 23. Collapse the disposal bag with a HEPA vacuum, twist top of bag, seal with at least 3 wraps of duct tape, bend over and seal again with at least 3 wraps of duct tape.
- G. For the removal of transite pipe, the entire work area shall be under the following work rules:
1. The Site/Demolition Contractor will excavate to access the pipe.

2. Excavate by hand to expose the pipe.
 3. Cut the pipe using mini enclosures.
 4. Remove the pipe including all ACM debris.
- H. For the removal of vinyl floor tile, linoleum, paper and mastic, the entire work area shall be under the following work rules:
1. Work to be performed using the full containment method.
 2. Seal all critical barriers.
 3. Protect all wall surfaces where or appropriate applicable.
 4. Negative air units with HEPA filtration will be used in the area.
 5. Flooring materials shall be removed until all visible debris is removed.
 6. All floor surfaces shall be encapsulated.
 7. Flooring materials shall be removed and dispose of as asbestos containing material. Removal shall be in accordance with DLS, DEP, and EPA regulations.
- I. For the removal of transite panels, transite planters, fume hoods and counter lab tops, the entire work area at a minimum shall be under the following work rules:
1. Seal all critical barriers.
 2. Place 2 layers of 6-mil polyethylene sheeting on the floor.
 3. Negative air units with HEPA filtration may be used in the area.
 4. Remove the material in as whole pieces as possible.
 5. Wrap the pieces in 2 layers of poly and label as asbestos waste.
 6. Remove any tracks, lathe or support material and dispose of as contaminated waste.
 7. Encapsulate the surface following removal.
- J. For the removal of interior windows and doors, the entire work area at a minimum shall be under the following work rules:
1. Seal all critical barriers.
 2. Place 2 layers of 6-mil polyethylene sheeting on the ground or floor.
 3. Remove door and window assembly including putty, glazing sill and frames. Use method least likely to damage adjoining masonry. Use tools designed for cutting, sawing, or grinding, not hammering or chopping.
 4. Review existing conditions with the Project Monitors prior to removal.
 5. Remove perimeter caulking and sealant from the door and window frames at jambs, heads and sills.
 6. Remove window anchors attached to the masonry and window frames.
 7. Removal and disposal shall be in accordance with DLS, DEP, and EPA regulations.
- K. For the removal of duct insulation, the entire work area at a minimum shall be under the following work rules:
1. Work to be performed using the full containment method.
 2. Seal all critical barriers.
 3. Negative air units with HEPA filtration shall be used in the area.
 4. Place 2 layers of 6-mil polyethylene sheeting on the floor.

5. Remove all insulation.
6. The ACM shall be removed until all visible debris is removed.
7. Removal and disposal shall be in accordance with DLS, DEP, and EPA regulations.

L. For the removal of sinks, the entire work area at a minimum shall be under the following work rules:

1. Seal all critical barriers.
2. Place 2 layers of 6-mil polyethylene sheeting on the floor under the sink.
3. Negative air units with HEPA filtration may be used in the area.
4. Disconnect the sink and place into a bag or wrap with poly.
5. Removal and disposal shall be in accordance with DLS, DEP, and EPA regulations.

M. For the removal of blackboards and glue daubs, the entire work area at a minimum shall be under the following work rules:

1. Seal all critical barriers.
2. Place 2 layers of 6-mil polyethylene sheeting on the ground or floor.
3. Remove the blackboards to expose the glue daubs. If found, scrape the glue daubs and remove all visible ACM from the walls. Use method least likely to damage masonry.
4. Review existing conditions with the Project Monitors prior to removal.
5. Wrap the ACM with poly.
6. Removal and disposal shall be in accordance with DLS, DEP, and EPA regulations.

3.12 DECONTAMINATION OF WORK AREA

- A. Maintain premises and public properties free from accumulation of waste, debris, and rubbish, caused by operations. Remove visible accumulations of asbestos material and debris. Wet clean all surfaces within the work area.
- B. Remove the plastic sheets from walls and floors only. Take proper care in folding up plastic sheeting to minimize dispersal of residual asbestos containing debris.
- C. Leave the windows, doors, and HVAC vents sealed. Maintain HEPA filtered negative air pressure systems, air filtration and decontamination enclosure systems in service.
- D. Remove all debris from floor of work area. This includes all trash, scraps of lumber, pipes and all visible asbestos debris. The asbestos debris is primarily deteriorated pipe insulation that has fallen to the ground. Dispose of all debris removed as asbestos contaminated waste. HEPA vacuum the entire floor.

- E. Clean all surfaces in the work area and any other contaminated areas with water and with HEPA filtered vacuum equipment. After cleaning the work area, wait 24 hours to allow for settlement of dust, and again wet clean and clean with HEPA filtered vacuum equipment all surfaces in the work area. After completion of the second cleaning operation, perform a complete visual inspection of the work area to ensure that the work area is free of visible asbestos debris. The negative pressure system may be shut down only after clean air has been achieved.
- F. Include sealed drums and all equipment used in the work area in the cleanup and remove from work areas, via the equipment decontamination enclosure system, at an appropriate time in the clean sequence.
- G. Conduct cleaning and disposal operations to comply with applicable ordinances and antipollution laws. Do not burn or bury rubbish and waste materials on job site. Do not dispose of volatile wastes in storm or sanitary drains. Do not dispose of wastes into streams or waterways.
- H. Store volatile wastes in covered metal containers during work hours and remove from premises at end of workday. Prevent accumulation of wastes, which create hazardous conditions. Provide adequate ventilation during use of volatile or noxious substances.
- I. If the Industrial Hygienist, within 24 hours after the second cleaning, finds visible accumulations of asbestos debris in the work area, repeat the wet cleaning until the work area is in compliance, at no additional expense to the Owner.
- J. Remove the first layer of plastic sheet from walls and floors only. Take proper care in folding up plastic sheeting to minimize dispersal of residual asbestos containing debris.
- K. Leave the windows, doors, and HVAC vents sealed. Maintain HEPA filtered negative air pressure systems, air filtration and decontamination enclosure systems in service.
- L. Following the final visual inspection by the IH, after the removal of asbestos-containing materials and decontamination of work areas, and while space enclosures systems remain in place, seal all surfaces from which asbestos-containing material have been removed to assure immobilization of any remaining fibers. Use a colored sealant so that complete coverage may be ensured by a visible inspection by the IH to verify that asbestos-containing material has been adequately removed. Apply sealer in accordance with manufacturer's recommendations using airless spray equipment.
- M. Clearance air samples will be taken by the IH using aggressive air sampling. Analysis will be made using Phase Contrast Microscopy or Transmission Electron Microscopy.
- N. Clean and decontaminate of all access routes used to transport ACM debris.

3.13 WORK AREA CLEARANCE

- A. The work is complete when the work area is visually clean and airborne fiber levels have been reduced to the level specified below. When this has occurred, the Asbestos Contractor will notify the Industrial Hygienist that the area is ready for clearance.
- B. The number and volume of air samples taken, and analytical methods used by the Industrial Hygienist will be in accordance with applicable regulations.
- C. The Owner will pay for the initial testing required for clearance. Should the initial testing fail, the Asbestos Contractor will reimburse the Owner for the cost of all additional testing based on \$90.00 per hour for Industrial Hygienist, \$30.00 per each PCM and \$150.00 per each TEM.

3.14 DISPOSAL OF ACM AND ASBESTOS CONTAMINATED WASTE

- A. To prevent exceeding available storage capacity on site, remove sealed and labeled containers of asbestos waste and dispose of such containers at an authorized disposal site in accordance with the requirements of disposal authority.
- B. Comply with 29 CFR 1926.1101.
- C. Seal all asbestos and asbestos contaminated waste material with double thickness 6-mil, sealable plastic bags. Label the bags; transport and dispose of all in accordance with the applicable OSHA and EPA regulations. At the end of the job, place all polyethylene material, tape, cleaning material and clothing in the plastic lined drum. Seal, correctly label, and dispose of as asbestos waste material.
- D. Transport the bags to the approved waste disposal site. Asbestos Contractor shall obtain trip tickets at the landfill to document disposal of asbestos containing materials. A form shall be signed, not initialed, by all parties. Copies of all trip tickets shall be submitted to the Industrial Hygienist.
- E. If a rental vehicle is used to transport asbestos waste, Asbestos Contractor shall provide to the vehicle's owner a written statement as to the intended use of the vehicle. A copy of such notice, signed by the vehicle owner, shall be provided to the Industrial Hygienist prior to transporting materials in the vehicle. Two layers of 6-mil plastic sheet shall be placed on the floor and walls of the rental vehicle prior to loading any containers of asbestos waste.
- F. Consider wastewater from showers and sinks to be contaminated waste and dispose of in accordance with this Section, unless water has been filtered through a 5-micron filter.

3.16 DISPOSAL OF NON-CONTAMINATED WASTE

- A. Remove from the site all non-contaminated debris and rubbish resulting from demolition operations. Transport materials removed from demolished areas and dispose of off site in a legal manner.

- B. During progress of work, clean site and public properties, and dispose of waste materials, debris, and rubbish. Provide on-site containers for collection of waste materials, debris, and rubbish. Remove waste materials, debris, and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.

3.17 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- A. After asbestos abatement work and decontamination is complete, relocate objects moved to temporary locations during the work to their former positions. Re-secure mounted objects removed during the work in their former positions and assure that they are in working order.

3.18 FINAL CLEAN UP

- A. Employ experienced workers or professional cleaners for final cleaning. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from exposed to view interior and exterior finished surfaces. Polish surfaces so designated.

3.19 ALTERNATE CONTAINMENT SYSTEM

- A. In lieu of the containment system previously described consisting of a decontamination enclosure system utilizing curtained doorway, and a negative air system to exhaust enough air to achieve one air change every 15 minutes, the following system will be allowed:
- B. Construct a decontamination unit consisting of a totally enclosed Equipment Room, Shower Room, Air Locks, and Clean Room as described above except that instead of curtained doorways between rooms, doorways shall be solid core rigid wooden or fiberglass doors. Door at entrance into Clean Room from the uncontaminated area shall contain a HEPA filter. This doorway shall have gasketed seals around the HEPA filter and the edges of the door to provide a tight seal. HEPA filter shall be mounted in the door securely using a mechanical fastening system. Each door shall be equipped with a self-closing mechanism.
- C. Negative pressure units as described previously shall be utilized to create a pressure differential of 0.02 inches of water between the work area and the outside uncontaminated area. Only the required air volume to create the negative pressure shall be exhausted through the HEPA filter unit outside the work area. Additional HEPA filter units shall be located within the work area to provide for air circulation.

END OF SECTION

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Section 02 41 17
BUILDING DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of demolition, clearing, removal and legal disposal, which includes, but is not limited to the following:
 - 1. Existing designated structures, foundations and slabs on grade.
 - a. Existing ABC (asphalt, brick and concrete) materials may at the Construction Manager's option be processed on or off site for appropriate reuse in accordance with 310 CMR 16.00 Site Assignment Regulations for Solid Waste Facilities and 310 CMR 19.000 Solid Waste Management Facility Regulations as they pertain to recycling/reusing ABC rubble.
 - 2. Cut, cap and seal-off abandoned utility lines at property line or as indicated within the Drawings and specifications, comply with the requirements of Section 31 10 00 – SITE CLEARING.
- B. Salvage removed indicated materials for re-use as shown in the Drawings and as indicated herein:
 - 1. The City of Worcester shall within one week after the last day of school remove salvaged items. The building shall be turned over to the Construction Manager the day after the last day of the school year.
 - 6. Carpentry:
 - a. Interior hand railings.
- C. Cut and remove existing utilities.
- D. Contractors are advised to visit the existing school site prior to providing a bid for this work to fully understand the scope of demolition, removal and disposal required. Refer to Section 01 14 00 – WORK RESTRICTIONS for additional instructions.
- E. Conduct walk-through of existing site prior to commencement of demolition work:
 - 1. Identify products for salvage and reuse in addition to those specified herein.
 - 2. Identify products of historic significance for salvage and determine disposition.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 02 28 20 - ASBESTOS REMEDIATION: Abatement of hazardous materials.
- F. Section 31 10 00 - SITE CLEARING: Site and utility demolition.
- G. Division 31 - EARTHWORK: Backfilling of open pits remaining after demolition.
- H. Utility shutoffs.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A10.6 – Safety Requirements for Demolition Operations.
 - 2. NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations.
- B. General References The following reference materials are hereby made a part of this Section by reference thereto:
 - 1. Massachusetts Department of Conservation and Recreation, “Asian Longhorn Beetle Quarantine” regulatory requirements.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.
- B. Pre-Demolition Meeting: At least two weeks prior to commencing the work of this Section, conduct a pre-demolition conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
 - 1. Required attendees: Architect, Construction Manager’s project manager and on-site superintendent, demolition subcontractor’s project superintendent, and representatives of related utility trades.
 - 2. Agenda:
 - a. Scheduling of demolition operations. Review critical demolition sequencing with other work.
 - b. Coordination of utility service requirements and disconnects.
 - 1) Review requirements for marking location of disconnected utilities, and project record (as-built) requirements.
 - c. Review of site use and staging locations.
 - 1) Review of storage locations for salvaged materials and materials for recycling program.
 - d. Procedures for processing field decisions.
 - e. Procedures for handling hazardous materials.

- f. Procedures for protection of general public from demolition operations.
- g. Establish weather and working temperature conditions to which Architect and Contractor must agree.
- h. Review potentially hazardous operations and fire protection procedures.
- i. Review general safety regulations and requirements for demolition work.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Schedule: Within 7 days after receiving the Notice to Proceed and prior to commencement of work, prepare a schedule indicating proposed methods and sequence of operations for demolition work. Include coordination for shut-off, capping, and continuation of utility services, together with details for dust and noise control protection.
 - a. Provide detailed sequence of demolition and removal work. Receive acceptance from Architect prior to commencing work.
 - b. List all salvageable materials.
 - 2. Special Procedure Submittals: Submit copies of written agreements from private landowners, landfill operators, or other agencies accepting disposal of demolished materials at least two weeks prior to commencement of demolition work.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 - 1. Record Documentation: Indicate actual location of capped site utilities.
 - 2. Sustainable Design Closeout Documentation: Submit all records for material donations, recycling and landfill disposal in accordance with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for demolition work, safety of structure, dust control, and disposal of debris. Conform to procedures applicable when discovering hazardous materials or contaminated substances.
 - 1. The Contractor is directed not to disturb or attempt removal of any discovered hazardous materials or contaminated substances. Removal shall be performed in accordance with Section 02 82 00 – ASBESTOS REMEDIATION.
 - 2. Removal or containment of the hazardous materials or contaminated substances shall be performed by the abatement subcontractor.
- B. Obtain and pay for required permits and licenses prior to commencing demolition work. Arrange and pay for legal disposal of removed materials and equipment, obtain proper disposal receipts for verification.
- C. The Contractor shall coordinate and pay for a full time fire watch to be provided by the City of Worcester Fire Department during building demolition operations. All detail work and water required for dust control and wetting down of the existing structure shall be provided by the Worcester Fire Department at the Contractor's expense.

- D. Notify affected utility companies and Owner before starting work and comply with utility company requirements.

1.7 QUALITY ASSURANCE

- A. General: Conduct the work in a manner giving prime consideration to protection of the public; protection from the weather, control of noise, shocks and vibration; control of dirt and dust; orderly access for and storage of materials; protection of existing buildings; protection of adjacent surfaces and property; coordination and cooperation with the Owner at all times.
 - 1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.
- B. Qualifications:
 - 1. Demolition subcontractor: Company specializing in performing work of this section with minimum 3 years documented experience.
 - 2. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
 - 3. Shoring and bracing design: Design shoring, and bracing (if deemed required), under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.8 SEQUENCING AND SCHEDULING

- A. Conduct the work in a manner giving prime consideration to protection of the public; protection from the weather, control of noise, shocks and vibration; control of dirt and dust; orderly access for and storage of materials; protection of existing buildings; protection of adjacent surfaces and property; coordination and cooperation with the Owner at all times.
- B. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.
- C. Unless permission in writing is obtained from the Owner no demolition or abatement of hazardous materials either interior or exterior shall be performed until the existing building has been fully vacated and permission obtained from the Owner to commence with abatement and demolition.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Contractor shall have examined the existing conditions per Section 01 10 00 - SUMMARY and reviewed Contract Documents prior to commencement of demolition.
 - 1. Owner assumes no responsibility for actual condition of areas to be demolished.
 - a. Notify both Owner and Architect, if any type of hazardous chemicals, gases, explosives, flammable material, unmarked containers, or similar dangerous substances are discovered. Cease work in affected areas until directed by Architect. Continue work in other areas.

2. Beginning of demolition means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Provide, erect and maintain temporary barriers to protect non-construction related pedestrian and vehicular traffic using the adjacent portions of the site.
- B. Prevent movement of adjacent new construction; provide required bracing and shoring.
- C. Protect existing landscaping materials, structures, and appurtenances which are not to be demolished.

3.3 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent and occupied building areas, in compliance with governing laws and buildings, with prime consideration given to the safety, protection and convenience of the public and Owner's personnel.
- B. Carefully observe existing structure during demolition operations, cease operations immediately if structure appears to be in danger. Notify Architect and do not resume operations until directed.
- C. Maintain protected egress and access to the Work at all times.

3.4 DUST CONTROL

- A. Wet down debris to prevent air pollution by dust rising from demolition work. and to prevent fires caused by vandals. Provide hoses and water connections for this purpose.
- B. Employ tarpaulins on trucks carrying debris to prevent spreading dust or debris. Clean up loose debris daily to prevent the wind spreading debris.

3.5 DEMOLITION

- A. Disconnect, cap and identify designated utilities within demolition areas.
 1. Cap and remove abandoned existing utilities at property line or as indicated within the Drawings and specifications.
- B. Carefully salvage and provide safe storage for equipment and materials designated for reuse, as indicated on the Drawings, as specified herein, or as requested by Owner for reuse on the project, or to be stored for Owner's future use. Take particular care with finished items and items requiring special handling.
- C. Demolish in an orderly and careful manner. Conduct demolition to minimize interference with adjacent structures and protect those which are to remain.
 1. Blasting operations for demolition is not permitted under this Contract.
 2. Cease operations immediately if adjacent structures appear to be in danger. Notify Architect, do not resume operations until directed.

3. Conduct operations with minimum interference to public or private accesses. Maintain protected egress and access at all times.
 4. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.
- D. Completely remove the building foundation walls and footings.
- E. Remove concrete slabs on grade. Refer to Appendices for location of existing pipe trenches and the asbestos specifications and report. Coordinate the removal of the slab and pipe trench cover with the removal of the asbestos pipe insulation and debris.
- F. As work progresses, regularly remove demolished materials from site, except salvaged materials as noted. Do not burn or bury materials on site, arrange for legal disposal of the same.
- G. Leave site in clean condition.
- 3.6 BACKFILL
- A. Backfill and compact areas excavated, open pits and holes caused as a result of demolition in accordance with Division 31 - EARTHWORK.
 - B. Rough grade and compact areas affected by demolition to maintain site grades and contours.
- 3.7 DISPOSAL OF DEMOLISHED MATERIALS
- A. General: Except for items or materials indicated or specified to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 1. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL, and specified waste diversion goals.
 2. As work progresses, regularly remove demolished materials from site. Do not allow demolished materials to accumulate on-site, except for materials for waste segregation and diversion for recycling.
 3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 4. Liquid Waste Management: Dispose of liquid waste in accordance with all applicable regulations. Consult all regulations (federal, provincial, state, and local) or a qualified waste disposal firm when characterizing waste for disposal. Contact manufacturer for MSDS sheets for product information, and recommendations for proposal disposal. Utilize licensed waste disposal companies as may be required, the following phone numbers for national companies are provided for the Contractor's convenience only.
 - a. Safety Kleen 1-888-217-7859.
 - b. Clean Harbors 1-800-444-4244.
 - c. Phillip Services 1-888-655-4331.

- B. Do not burn or bury demolished materials on site, arrange for legal disposal of the same.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
 - 1. Comply with waste management reporting requirements on forms acceptable to the Owner.
 - 2. Record the amount (in tons or cubic yards) of material landfilled from the Project, the identity of the landfill, the total amount of tipping fees paid, transportation costs (if separate) and the total disposal cost. Include manifests, weight tickets, receipt, and invoices

3.8 CLEANING

- A. Daily cleaning: Sweep all street and roads affected by demolition operations.
- B. Upon completion of the work of this Section:
 - 1. Remove unused tools and equipment, surplus materials, rubbish, and debris. Leave area in raked or broom-clean condition, as appropriate.
 - 2. Clean adjacent structures and facilities of dust, dirt and debris caused by demolition work to the satisfaction of Owner, owner(s) of adjacent properties, and authorities having jurisdiction.

End of Section

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Section 03 05 13
CONCRETE SEALERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install concrete sealers/coatings on exposed-to-view concrete floors where shown and as scheduled on the Drawings.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 - CAST-IN-PLACE CONCRETE:
 - 1. Placing and finishing concrete slabs.
 - 2. Dustproofing concrete slabs exposed to view at Auditorium.
- B. Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING: General preparation and testing requirements of flooring substrate.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C156 – Water Retention by Liquid Membrane-Forming Curing Compounds for Concrete.
 - 2. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.
 - 3. ASTM C1315 - Liquid Membrane-Forming Compounds, having Special Properties for Curing and Sealing Concrete

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all finishing products to be applied hereunder.
 - a. Include certification of data indicating Volatile Organic Compound (VOC) content of all coatings.
 - 2. Samples of each level of slip resistance, aggregate, and pattern available in the specified products from the proposed manufacturer.
 - 3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.

- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.5 QUALITY ASSURANCE

- A. Use an applicator approved by the manufacturer, experienced in the approved materials, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.6 ENVIRONMENTAL CONDITIONS

- A. Work shall be done only under optimum conditions as recommended by manufacturer. Surfaces over which sealer is to be applied shall be completely dry (minimum 30 days since concrete placement) and thoroughly clean. Maximum moisture content is 8 percent. Substrate and ambient temperature shall be between 60 and 90 degrees Fahrenheit (15 to 32 degrees Celsius).

1.7 PRODUCT HANDLING

- A. Deliver materials to the job site and store in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Transparent non-yellowing water-based acrylic sealer having a minimum of 25 percent solids, with a maximum VOC limit of 100 g/L. Subject to compliance with ASTM C309, Type 1, Class A, ASTM C1315 Type 1, Class A, and requirements specified herein.
 - 1. Products which may be incorporated in the work include the following, or approved equal:
 - a. Laticrete International Inc., Bethany CT, (L&M Construction Chemicals Brand), Omaha NE, product "Dress & Seal WB25".
 - b. Dayton-Superior, Miamisburg OH, (Symons Brand), Des Plaines, IL, product "Cure & Seal 1315EF".
 - c. Nox-Crete Inc., Omaha NE, product "Cure & Seal 250E".

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Upon acceptance of completed substrate surfaces, thoroughly remove all dust and debris by sweeping or vacuum cleaning.
- B. Remove laitance, curing sealers, and other foreign matter from concrete surfaces with necessary techniques such as shot blasting, Muriatic acid etching, surface freezing and power scarification.

- C. Surface preparation required if a curing compound has been applied to substrate surfaces.
1. Thoroughly etch concrete surfaces using well mixed solution consisting of two parts by volume water diluted with one part by volume 30 percent commercial grade hydrochloric acid at a rate of one quart per ten square feet. Apply evenly to thoroughly saturated areas and scrub into surfaces using stiff-bristled broom. Allow solution to activate undisturbed for not less than five minutes or for duration of boiling effect.
 2. Thoroughly remove etching solution by washing down surfaces with clean water; flooded at least three separate times at a rate of two gallons per ten square feet; thoroughly remove all contaminates that may be engrained or latent in surfaces.
 3. Perform a test application of a square foot in three locations, such as beneath casework. Allow to set for 72 hours, and test adhesion as recommended by the manufacturer.

3.2 APPLICATION

- A. Apply sealer with manufacturer's recommended sprayer, at recommended rate of 400 square feet per gallon. Apply second coat when sealer is dry to touch. Allow sealer to cure undisturbed for a minimum period of 6 hours. Maintain temperature at 60 degrees Fahrenheit minimum until floor surfacing has completely dry.

End of Section

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Section 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK

- A. Work Included: This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes. Cast-in-place concrete shall include, but not be limited to the following:

1. Foundations, piers, and footings.
2. Slabs-on-grade.
3. Fill for steel deck.
4. Foundation walls.
5. Shear walls.
6. Equipment pads and bases. Housekeeping pads.
7. Fill for steel pan stairs and landings.
8. Exterior concrete door pads.
9. Concrete dumpster pads.
10. Concrete thrust and anchor blocks.
11. Exterior pads for HVAC and electrical equipment.
12. Exterior concrete steps.
13. Exterior concrete sidewalks where indicated.
14. Concrete for miscellaneous items: flagpoles, exterior equipment relocation, playground structure bases, and additional site structures.
15. Miscellaneous concrete for fills and encasement.
16. Provide and install concrete work at mockup building.
17. Concrete drilled foundations at scoreboards and solar canopies.
18. Exterior concrete retaining walls and bases.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of all the General and Subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that a Contractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated contractors of their responsibilities regardless of what alternate(s) are selected at no extra cost will be charged to the Owner. Refer to Section 01 23 00, ALTERNATES for the list and description of Alternates.

- C. Items To Be Installed Only:

1. Install volleyball net inserts provided by Section 11 66 23.

- D. Items To Be Furnished Only: Not Applicable.

- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 01 45 00, QUALITY CONTROL.
 2. Section 01 45 29, TESTING LABORATORY SERVICES
 3. Section 01 45 90, PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS, Program of Structural Tests and Inspections, Schedule of Tests and Inspections
 4. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
 5. Section 31 20 10, EARTH MOVING; Excavation and establishment of subgrade elevations, site preparation.
 6. Section 03 05 13, CONCRETE SEALERS.
 7. Section 04 20 00, UNIT MASONRY; Masonry work.
 8. Section 05 12 00, STRUCTURAL STEEL; Structural steel.
 9. Section 05 31 00, STEEL DECK.
 10. Section 06 10 00, ROUGH CARPENTRY.
 11. Section 07 00 01, WATERPROOFING, DAMPPROOFING, AND CAULKING.
 12. Section 07 13 53, ELASTOMERIC SHEET WATERPROOFING.
 13. Section 07 16 13, POLYMER MODIFIED CEMENT WATERPROOFING.
 14. Section 07 95 13, EXPANSION JOINT COVERS.
- F. Sustainable Design: Comply with project requirements intended to achieve sustainable design, measured and documented according to the LEED Green Building Rating System of the US Green Building Council. Refer to Section 01 81 13 "Sustainable Design Requirements" for certification level and certification requirements.

1.03 SUBMITTALS

- A. Refer to Section 01 33 00, SUBMITTAL PROCEDURES for submittal provisions and procedures.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, water-stops, joint systems, curing compounds, dry-shake finish materials, and others if requested by the Architect or SER.
- C. Shop drawings for reinforcement detailing, fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement.
1. All reinforcing shop drawings for concrete and masonry walls shall be shown on walls elevations with a scale of 1/4 in. = 1 ft. - 0 in.
 2. Include special reinforcing required for openings through concrete structures.
 3. Submit shop drawings of formwork for Architecturally Exposed Concrete showing cone tie patterns and form liner layout.
- D. Electronic Submittals: Refer to Section 01 33 00 for Submittal Procedure. In addition, provide Engineer (1) fullsize paper print of each shop drawing, in addition to the electronic submittal. Paper copy will be retained by the Engineer and electronic copy will be returned. Review cycle will not commence until paper copy of shop drawing has been received.

- E. Concrete mix design for each mix specified. Supporting test data shall be submitted if requested.
- F. Proposed method of curing concrete and associated products.
- G. Proposed precautions for hot weather and cold weather concreting.
- H. Samples of materials as requested by Architect, including names, sources, and descriptions.
- I. Laboratory test reports for concrete materials and mix design test.
- J. Description of Methods and Sequence of Placement. For each type of specially-finished concrete provide description of methods and sequence of placement.
- K. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where requirements that are more stringent are shown or specified:
 - 1. Massachusetts State Building Code, Current Edition.
 - 2. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings".
 - 3. ACI 318, "Building Code Requirements for Reinforced Concrete".
 - 4. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".
 - 5. Manual of Standard Practice for Detailing Reinforced Concrete Structures ACI 315.
 - 6. ACI 308, "Recommended Practice for curing Concrete"
 - 7. ASTM C 94, Ready-Mixed Concrete.
 - 8. ACI 213, "Guide for Structural Lightweight Aggregate Concrete"
- B. Inspection, Testing, and Quality Control
 - 1. A Program of Inspection and Testing of cast-in-place concrete work will be established by the Structural Engineer of Record (SER) who will direct the implementation of tests as carried out by an Independent Testing Agency, under a separate contract with the Owner. Materials and workmanship shall be subjected to inspection and testing in mill, shop, and/or field by the SER and/or Testing Agency. Such inspection and testing shall not relieve the Contractor of his responsibility to provide his own inspection, testing, and quality control as necessary to furnish materials and workmanship in accordance with requirements of Contract Documents.
 - 2. The General Contractor shall notify the SER and the Testing Agency prior to start of any phase of concrete work so as to afford them reasonable opportunity to inspect the work. Such notification shall be made at least 24 hours in advance.
- C. Project Data:

1. Concrete Curing and Protection: Submit to the Architect/SER in accordance with the requirements of Contract Documents, detailed methods proposed for use for curing and protection prior to commencement of concrete work. This shall include winter protection and hot weather concrete methods.
- D. Preconstruction Conference. Attend a preconstruction conference prior to the start of architectural concrete construction as directed by the Owner's Representative and the Architect. Discussion will include the following:
1. The Contractor's program to obtain the specified quality of architectural concrete.
 2. The procedures and methods for construction of preconstruction mock-ups specified herein.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with Section 01 60 00, PRODUCT REQUIREMENTS.
1. Reinforcing steel and other items to be embedded in cast-in place concrete which are stored at the project site shall be above ground on platforms, skids or other supports, protected from the elements by a waterproof covering ventilated to prevent condensation.
- B. General Contractor shall provide and pay for all dumpster services during the entire construction period. Suppliers and Sub-Contractors to bring all rubbish and debris to the dumpster location daily. No costs are to be assessed to the suppliers or Sub-Contractors by the General Contractor for this service.
- C. General Contractor, Sub-Contractors, and suppliers are all individually to furnish their own staging, scaffolding, and hoisting equipment necessary to get workers, material, and equipment from the point of delivery at the project site to the point of use or installation within the building and project site. All crane and rigging services required are the responsibility of each individual trade.

1.06 PRECONSTRUCTION MOCK-UPS

A. General

1. Schedule mock-up casting for acceptance 5 days prior to casting of concrete surfaces represented by the mockups.
2. Locate mock-up panels in non-public areas accepted by the Architect.
3. Continue to cast mock-ups until acceptable mock-ups area produced. Accepted mock-ups shall be the standard for color, texture, finish, jointing, and workmanship for the work.
4. Mock-up sequence of forming, placing, form removal, curing, and finishing shall be reviewed and accepted by the Architect.
5. Demonstrate in the construction of the mock-up formwork the sealer material, form release agent, and curing materials and methods to be used.
6. Mock-up formwork shall be inspected and accepted by the Architect before placing of concrete.

7. Use the same concrete mixes and placement procedures, accepted in mock-ups, in the final work, unless otherwise directed by the Architect.
 8. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-up.
 9. Remove mockups from site at completion of project, as directed by the Architect.
- B. Mockups: Cast mockups of full-size sections simulating actual design and execution conditions for concrete mix materials, reinforcement, formwork, placing sequence, form removal, curing, finishing, methods and materials of stain removal and correction of defective work, and overall standard of workmanship.
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - a. Wall 4' x 8' Section
 2. Notify Architect three days in advance of dates and times when mockups will be constructed.
 3. Obtain Architect's approval of mockups before starting construction.
 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed concrete. If approved by the Landscape Architect mockup panels may be part of the final construction.
 5. Demolish and remove approved mockups (not part of final construction) from the site when directed by Architect.

1.07 LEED Submittals- Refer to Section 01 81 13 "Sustainable Design Requirements."

- A. Project materials cost data: Provide statement indicating total cost for materials used for the Project.
- B. Sourcing of Raw Materials: Provide submittals indicating how the following requirements will be met (MRc3):
 1. List of proposed materials with recycled content: Manufacturers' certification of recycled content indicating percentage by weight of both pre-consumer and post-consumer recycled content. Include statement of costs.
 2. Submit required information using the LEED Data form for the following LEED items:
 - a. Local/Regional Materials:
 - 1) Sourcing location(s): Indicate location of extraction, harvesting and recovery of raw materials used in the products' manufacturing; indicate the distance between extraction, harvesting and recovery and the project site. Indicate percentage of product content from qualified locations.
 - 2) Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two (2) edges and one (1) side for tight fit.
- C. Forms for Exposed Finish Concrete Site Structures (Walls, Stairs, Misc. Structures):
1. For walls identified as smooth finish: Form-Facing Panels for As-Cast Finishes: Smooth Thinform MDO or EQ, Steel, glass-fiber-reinforced plastic, high-density overlay, Class 1, or better, Finnish phenolic overlaid birch plywood or other approved nonabsorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces in accordance with ACI 303.1. Furnish in largest practicable sizes to minimize number of joints.
 2. For walls identified as Formliner finish: Formliner shall be Reckli flexible liner 2/195 Gysenberg by Reckli.com/en, US contact: Mr. Ray Clark 370 Commerce Boulevard, 30606 Athens Georgia, United States of America; p:706.355.3217; #6010 Random Width and Depth Aged Cedar V-Lite ABS low reuse plastic liner by Custom Rock Formliner 202 West 7th Street, St Paul, MN 55116, customrock.com or approved equal.
 3. For walls W21, 22 and 24 located at children's playground areas formliner finish shall be 2/154 Venta or 2/227 Tirari by Reckli flexible liner, Reckli.com/en, US contact: Mr. Ray Clark 370 Commerce Boulevard, 30606 Athens Georgia, United States of America; p:706.355.3217, or #8036 Circles #1, #8027 Dragonfly #1 by Custom Rock Formliner 202 West 7th Street, St Paul, MN 55116, customrock.com or approved equal.
 4. Formwork shall produce an extremely accurate finish as displayed in approved mockup.
 5. Form Sealers: In accordance with ACI 303 Chapter 4, Section 4.8 for each different type of formwork material or liner. Sealers containing oils will not be permitted.
 6. Form Release Agents: In accordance with ACI 303 Chapter 4, Section 4.9 for each different type of formwork material or liner.
 7. Vertical joints shall be expressed with a reveal, therefore formwork shall include a blackout or liner accessory that will produce a recessed joint as indicated on the Drawings.
- D. Concrete Column Forms: Sonotube Concrete Forms, manufactured by Sonoco, 1 North Second Street, Hartsville, South Carolina 29550. Toll Free (888) 875-8754. Website www.sonotube.com. E-mail terry.mckee@sonoco.com.
1. Description: Multiple layers of 100 percent recycled paperboard, spirally wound, and laminated with adhesive.
 2. Interior Surface: Smooth with spiral seam. Moisture barrier plastic coating.
 3. Exterior Surface:
 - a. Sonotube RainGuard – 100 percent recycled paper, b. Sonotube Commercial - Moisture Barrier outer label.
 4. Forms will impart visible spiral mark on concrete columns.
 5. 1-piece, 1-time-use forms.

6. Recyclable.
7. Inside Diameter: As indicated on the Drawings.

- E. Chamfer strips shall be wood, PVC or rubber strips.
- F. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 1. Formulate form release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties for Concrete Below Grade or Areas Not Exposed to View: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal.
 1. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

2.02 METAL REINFORCING MATERIALS

- A. All steel is to consist of a minimum of 95% recycled steel with over 80% post-consumer and 15% pre-consumer recycled content in compliance with LEED requirements.
- B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- C. Steel Wire: ASTM A 82, plain, cold-drawn steel, Refer to "Special Requirements for Architecturally Exposed Concrete" for required stainless steel wire.
- D. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. All welded wire fabric shall be supplied in flat sheets.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs. Concrete bricks may be used to support reinforcing steel where application allows.

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II.
- B. Normal-Weight Aggregates: ASTM C 33 and as specified.
- C. Light-Weight Aggregates: Expanded shall, clay or slate produced by the rotary kiln method and shall conform to ASTM C330.
- D. Natural sand: ASTM C33.
- E. Water: Potable, clean and free from oils, acids, alkali, and other deleterious material.

- F. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- G. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- H. Water-Reducing Admixture: ASTM C 494, Type A.
- I. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.
- J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.
- K. Water-Reducing, Accelerating Admixture: ASTM C494, Type E.

2.04 RELATED MATERIALS

- A. Water-stops: Provide flat, dumbbell-type or center-bulb-type water-stops at construction joints and other joints as indicated. Size to suit joints.
- B. Polyvinyl Chloride Water-stops: Corps of Engineers CRD-C 572.
- C. Sand Cushion: Clean, manufactured, or natural sand.
- D. Vapor Retarder: Refer to Section 07 26 00 for vapor retarder.
- E. Bituminous Mastic: Refer to Section 07 26 00 for bituminous mastic coating for steel encased in concrete.
- F. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- G. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 - 1. Water proof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene coated burlap.
- H. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.
- I. Evaporation Control: Mono-molecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
- J. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from one (1) inch thick to feathered edges.
- K. Bonding Agent: Polyvinyl acetate or acrylic base.
- L. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

- M. Epoxy Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.
- N. Clear Penetrating Sealer for Concrete: Refer Section 03 05 13, CONCRETE SEALERS.
- O. Preformed Expansion Joint Filler: Resilient, flexible, non-extruding, expansion-contraction joint filler. Cellular fibers securely bonded together, uniformly saturated with asphalt. Joint filler shall conform to the following standards and have the following requirements:
 - 1. ASTM D1751.
 - 2. Resilience: When compressed to half its original thickness, recover to a minimum of 70 percent of its original thickness.
 - 3. Thickness: ½".

2.05 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- B. Submit written reports to Architect of each proposed mix for each class of concrete at least fifteen (15) days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect/SER
- C. Footings: Proportion normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi.
 - 2. Maximum Slump: 4 inches.
 - 3. Slump may be increased to 6 inches with use of Mid-Range Water Reducing Admixture.
 - 4. Maximum water-cement ratio: 0.48
 - 5. No substitution of other cementitious materials for Portland Cement.
- D. Foundation Walls: Proportion normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi.
 - 2. Maximum Slump: 3 inches.
 - 3. Slump may be increased to 5 inches with use of Mid-Range Water Reducing Admixture.
 - 4. Air-entrained
 - 5. Maximum water-cement ratio: 0.48
 - 6. No substitution of other cementitious materials for Portland Cement.
- E. Slab-on-grade (Typical interior slab-on-grade, unless notes otherwise): Proportion normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 3000 psi
 - 2. Maximum Slump: 4 inches.
 - 3. Slump may be increased to 6 inches with use of Mid-Range Water Reducing Admixture.
 - 4. Maximum water-cement ratio: 0.55
 - 5. No substitution of other cementitious materials for Portland Cement.

- F. Slab-on-grade (4000 psi slabs, see plans for locations): Proportion normal-weight concrete with the following properties:
1. Compressive Strength (28 Days): 4000 psi
 2. Maximum Slump: 4 inches.
 3. Slump may be increased to 6 inches with use of Mid-Range Water Reducing Admixture.
 4. Maximum water-cement ratio: 0.48
 5. No substitution of other cementitious materials for Portland Cement.
- G. Suspended slabs: Proportion light-weight concrete (115 pcf) with the following properties:
1. Compressive Strength (28 Days): 3000 psi
 2. Maximum Slump: 4 inches.
 3. Slump may be increased to 6 inches with use of Mid-Range Water Reducing Admixture.
 4. Maximum water-cement ratio: 0.55
- H. Exterior Walks, Aprons, Stairs, Ramps, and Miscellaneous Exterior Structures: Proportion normal-weight concrete with the following properties:
1. Compressive Strength (28 Days): 4000 psi
 2. Maximum Slump: 4 inches.
 3. Slump may be increased to 6 inches with use of Mid-Range Water Reducing Admixture.
 4. Air-entrained
 5. Maximum water-cement ratio: 0.44
- I. Exterior Caissons at Solar Canopy & Scoreboards: Proportion normal-weight concrete with the following properties:
1. Compressive Strength (28 Days): 5000 psi
 2. Maximum Slump: 4 inches.
 3. Slump may be increased to 6 inches with use of Mid-Range Water Reducing Admixture.
 4. Air-entrained
 5. Maximum water-cement ratio: 0.40
- J. Under no conditions shall water be added to the concrete mixes at the site.
- K. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by SER. Laboratory test data for revised mix design and strength results must be submitted to and accepted by SER before using in Work.
- L. All pumped concrete shall contain mid-range water reducing admixture or high range water reducing admixture (superplasticizer) added at the site. Maintain slumps as specified above

2.06 ADMIXTURES

- A. Use mid-range water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for pumping, placement and workability.
- B. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F.
- C. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
 - 1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure: 5.0 percent (moderate exposure); 6.0 percent (severe exposure) for 3/4-inch maximum aggregate.
- D. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.07 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
 - 1. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to seventy-five 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to sixty (60) minutes.

PART 3 EXECUTION

3.01 GENERAL

- A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.02 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal. Use 6 mil poly to cover rustication keyways to ensure easy removal without chipping concrete.
- D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.03 VAPOR RETARDER/BARRIER INSTALLATION

- A. General: Refer to Section 07 26 00 for material requirements and installation requirements.

3.04 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports and as specified.
 - 1. Avoid cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverage as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

- E. Install flat welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one (1) full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.05 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Water-stops: Provide water-stops in construction joints as indicated. Install water-stops to form continuous diaphragm in each joint. Support and protect exposed water-stops during progress of Work. Field-fabricate joints in water-stops according to manufacturer's printed instructions.
- F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated. Joint fillers and sealants are specified under Division 7.
- G. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels or patterns as shown. Use a "Soff-Cutt", or approved equal, saw for cuts 1/8 inch wide by one-fourth of slab depth or inserts ¼ inch wide by one-fourth of slab depth, except use ¼ inch wide sawn joints for joints filled with epoxy joint filler. Saw cutting shall begin immediately after final finishing.
 - 1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
 - 2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 - 3. If joint pattern is not shown, provide joints not exceeding fifteen (15) feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays). Joint fillers and sealants are specified under Division 7.

3.06 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

- B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.07 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, non-residual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 - 1. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.08 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete", and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than twenty-four (24) inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least six (6) inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 3. Maintain reinforcing in proper position on chairs during concrete placement.
- F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
 3. Cover walls and slabs with thermal blankets. Provide poly tents with heat for twenty-four (24) hours when temperature is 40 degrees F or below.
- G. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 degrees F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.
- H. Re-tempering of concrete which has partially hardened, that is, mixing with or without additional cement, aggregates, or water, shall not be permitted.

3.09 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction (other than waterproofing systems). This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as

waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

Additional requirements at foundation wall surfaces to receive Elastomeric Sheet Waterproofing (Spec. 07 13 53) include:

1. Surface to be prepared in accordance with Elastomeric Sheet Waterproofing Manufacturer's requirements.
2. Surface must be smooth, and free of unapproved curing compounds, form release agents and other surface contaminants.
3. Fill form tie rod holes with concrete and finish flush with surrounding surface.
4. Repair bug holes over ½ inch in length and ¼ inch deep and finish flush with surrounding surface.
5. Remove scaling to sound, unaffected concrete and repair exposed area.
6. Grind irregular construction joints to suitable flush surface.

Additional requirements at foundation wall surfaces to receive Polymer Modified Cement Waterproofing (Spec. 07 16 13) include:

1. Surface to be prepared in accordance with Polymer Modified Cement Waterproofing Manufacturer's requirements.
2. Thoroughly remove all curing compounds, form release agents and other surface contaminants. Clean walls by high-pressure wash or sand blast, and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
3. Fill form tie rod holes with concrete and finish flush with surrounding surface.
4. Repair cracks, breaks, voids, honeycombing larger than 1/32 inch width with hydraulic cement.
5. Remove scaling to sound, unaffected concrete and repair exposed area.
6. Grind irregular construction joints to suitable flush surface.

C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces to receive smooth-formed finish treatment not later than one (1) day after form removal.

1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces to receive grout-cleaned finish treatment.

1. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard Portland cement and white Portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least thirty-six (36) hours after rubbing.

- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
1. After placing slabs, finish surface to tolerances of F(F) 30 (floor flatness) and F(L) 25 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes. Finish surfaces to following tolerances in accordance with ASTM 1155
 - a. Floor Flatness Number F_F : Specified Overall Value = 30
Minimum Local Value = 20
 - Floor Levelness Number F_L : Specified Overall Value = 25
Minimum Local Value = 20
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. Finish surfaces to following tolerances in accordance with ASTM 1155
 - a. Concrete slabs-on-grade:
Floor Flatness Number F_F : Specified Overall Value = 30
Minimum Local Value = 20
 - Floor Levelness Number F_L : Specified Overall Value = 25
Minimum Local Value = 20
 - b. Concrete slab-on-deck shall be finished with floor flatness tolerances in accordance with ACI 302-8.15 and $F_F = 30$ minimum.
- C. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or thin-set quarry tile, paint, or another thin film-finish coating system.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting; keep continuously moist for not less than seven (7) days.
- C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
- D. Provide moisture curing by the following methods:
 - 1. Use continuous water-fog spray.
 - 2. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a four (4) inch lap over adjacent absorptive covers.
- E. Provide moisture-retaining cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least three (3) inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- F. Apply curing compound on exterior slabs, walks, and curbs as follows:

1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within two (2) hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.
 2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
1. Cure concrete slabs and surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.13 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F for twenty-four (24) hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

3.14 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.15 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than one (1) inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 2. For surfaces exposed to view, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color

match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

- B. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
 - 1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- C. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
 - 1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 - 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least fourteen (14) days.
 - 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
 - 4. Repair defective areas, except random cracks and single holes not exceeding one (1) inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- D. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- E. Repair methods not specified above may be used, subject to acceptance of Architect.

3.16 SITE WALL CHAMFER

- A. Chamfers to be 1/2" Max. and on horizontal wall edges only.

3.17 JOINT FILLING

- B. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least nine months. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid epoxy joint filler full depth in saw-cut joints and at least $\frac{3}{4}$ inches deep in formed joints. Overfill joints and trim joint filler flush with the top of the joint after hardening.

3.18 THRUST AND ANCHOR BLOCKS

- A. Minimum bearing areas for thrust blocks and dimensions of anchor blocks will be as shown on the Drawings.
- B. Concrete for thrust and anchor blocks will be placed against undisturbed earth, and wooden side forms will be used to provide satisfactory lines and dimensions. Felt roofing paper will be placed to protect the joints. No concrete will be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints.

3.19 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. An independent Testing Laboratory, chosen by the Owner, will be retained for this project to perform such laboratory services as are required. The engagement of this laboratory will in no way relieve the Contractor of his responsibility to furnish materials and construction in conformance with the drawings and specifications.
- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.
 - 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one (1) test at point of discharge (at the truck before adding plasticizers) for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one (1) for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one (1) test hourly when air temperature is 40 degrees F and below, when 80 degrees F and above, and one (1) test for each set of compressive-strength specimens
 - d. Compression Test Specimen: ASTM C 31; one (1) set of four (4) standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one (1) set for each day's pour exceeding five (5) cu. yds. plus additional sets for each fifty (50) cu. yds.

more than the first twenty-five (25) cu. yds. of each concrete class placed in any one (1) day; one specimen tested at seven (7) days, two specimens tested at twenty-eight (28) days, and one specimen retained in reserve for later testing if required.

2. When frequency of testing will provide fewer than five (5) strength tests for a given class of concrete, conduct testing from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used. When total quantity of a given class of concrete is less than fifty (50) cu. yds., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
 3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 4. Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within twenty-four (24) hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at twenty-eight (28) days, concrete mix proportions and materials, compressive breaking strength, and type of break for both seven (7) day tests and twenty-eight (28) day tests.
- D. Any material or workmanship that is rejected by the SER and/or the Testing Agency either at the plant or at the job site, shall be replaced promptly by the Contractor to the satisfaction of the SER at no expense of the Owner.
- E. Non-destructive Testing: Impact hammer, sonoscope, or other non-destructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

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Section 03 30 01
CAST-IN-PLACE CONCRETE - SITEWORK

PART 1 GENERAL

1.0 RELATED DOCUMENTS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:
- 01 30 00 – SUBMITTALS
 - 01 43 39 – MOCK-UPS
 - 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS

1.1 DESCRIPTION OF WORK

- A. Provide all equipment and materials, and do all work necessary to construct the cast-in-place concrete for sitework, including but not limited to: cast-in-place concrete site walls, exterior concrete stair stringers, below grade slabs, pads, bases, foundations, and footings, complete, as indicated on the Drawings and as specified.

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to the following:
1. Section 05 50 01, EXTERIOR METAL HANDRAILS AND GUARDRAILS.
 2. Section 07 92 00, EXTERIOR JOINT SEALANTS.
 3. Section 31 20 00, EARTH MOVING; Excavation, backfill, compaction, and establishment of subgrade elevations.
 4. Section 32 13 13, CONCRETE PAVING; Exposed concrete paving.

1.3 RELATED WORK

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
1. American Concrete Institute (ACI):
 - 301 Structural Concrete for Buildings
 - 303R Guide to Cast-In-Place Architectural Concrete Practice
 - 306.1 Cold Weather Concreting
 - 308 Standard Practice for Curing Concrete
 - 325.9R Guide for Construction of Concrete Pavements and Concrete Base
 2. American Plywood Association (APA):

Ref. 1 APA Design/Construction Guide, Residential and Commercial

3. American Society for Testing and Materials (ASTM):

A 36	Structural Steel
A 123	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
A 185	Welded Steel Wire Fabric for Concrete Reinforcement
A 307	Carbon Steel Externally Threaded Standard Fasteners
A 386	Zinc Coating (Hot-Dip) on Assembled Steel Products
A510	General Requirements for Wire Rods and Course Round Wire, Carbon Steel
A 569	Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality
A 615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 33	Concrete Aggregates
C 143	Slump of Portland Cement Concrete
C 150	Portland Cement
C 171	Sheet Materials for Curing Concrete
C 309	Liquid Membrane-Forming Compounds for Curing Concrete
C 494	Chemical Admixtures for Concrete Joint Fillers for Concrete Paving and Structural Construction

4. Commonwealth of Massachusetts Highway Department (MHD):

Specifications Standard Specifications for Highways and Bridges

1.4 SUBMITTALS

- A. Shop drawings of reinforcing steel shall be submitted. Drawings shall indicate bar sizes, locations, spacings, quantity required, bending and cutting schedules, and supporting and spacing devices.

- B. Formwork Shop Drawings: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect exposed to view cast-in-place concrete.
- C. Prior to start of concrete work, Contractor shall submit to the Architect for review a schedule for execution of the work of this section and a location plan indicating sequence of concrete placement and location of proposed control joints and construction joints, if required.
- D. Samples of the following shall be submitted:
 - Pre-formed joint filler (2) pieces, full depth and width, 4" length
 - Form liner (2) pieces
 - Form Tie (1) full size

1.5 PRECONSTRUCTION MOCK-UPS

- A. General
 - 1. Schedule mock-up casting for acceptance 5 days prior to casting of concrete surfaces represented by the mockups.
 - 2. Locate mock-up panels in non-public areas accepted by the Architect.
 - 3. Continue to cast mock-ups until acceptable mock-ups are produced. Accepted mock-ups shall be the standard for color, texture, finish, jointing, and workmanship for the work.
 - 4. Mock-up sequence of forming, placing, form removal, curing, and finishing shall be reviewed and accepted by the Architect.
 - 5. Demonstrate in the construction of the mock-up formwork the sealer material, form release agent, and curing materials and methods to be used.
 - 6. Mock-up formwork shall be inspected and accepted by the Architect before placing of concrete.
 - 7. Use the same concrete mixes and placement procedures, accepted in mock-ups, in the final work, unless otherwise directed by the Architect.
 - 8. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-up.
 - 9. Remove mockups from site at completion of project, as directed by the Architect.
- B. Mockups: Cast mockups of full-size sections simulating actual design and execution conditions for concrete mix materials, reinforcement, formwork, placing sequence, form removal, curing, finishing, methods and materials of stain removal and correction of defective work, and overall standard of workmanship.
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - a. Wall 4' x 8' Section
 - 2. Notify Architect three days in advance of dates and times when mockups will be constructed.
 - 3. Obtain Architect's approval of mockups before starting construction.
 - 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed concrete. If approved by the Landscape Architect, mock-up panels may be part of the final construction.
 - 5. Demolish and remove approved mockups (not part of final construction) from the site when directed by Architect.

- C. Source of Materials. Utilize the same source, stock, or brand of concrete materials for each class or mix of concrete which is to be exposed. Do not interchange materials or mixes until an additional mock-up shows that uniformity in finish texture and color, as compared to original mock-up will be maintained. If necessary, obtain and stockpile materials in sufficient quantity to ensure continuity and uniformity.

1.6 DESIGN OF CONCRETE MIX

- A. Mix design shall be certified by independent testing laboratory. Statement of materials constituting design of mixes (as required by referenced standards) shall be submitted for Architect's approval within one week following award of Contract.
- B. Concrete mix design shall include the following information:
 - 1. Proportions of cement, fine and coarse aggregates, and water.
 - 2. Water-cement ratio, design strength, slump, and air content.
 - 3. Type of cement and aggregates.
 - 4. Type and dosage of all admixtures.
 - 5. Special requirements for pumping.
 - 6. Range of ambient temperature and humidity for which the design is valid.
 - 7. Any special characteristics of the mix which require precautions in the mixing, placing, finishing, or curing methods to achieve the finished product specified.
- C. No concrete shall be delivered to the job site until the Architect has approved the design mixes.

1.7 QUALITY ASSURANCE

- A. Unless otherwise specified, cast-in-place concrete work shall conform to ACI 301. Construction of concrete subbases shall conform to ACI 325.9R
- B. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features indicated on the Drawings are approximate. Manufacturer's approved shop drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size, and details.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- D. Preinstallation Conference: Conduct conference at Project site.

1.8 TESTING

- A. Inspection and testing of the concrete mix will be performed by an independent testing laboratory approved by the Architect. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel.
- B. Concrete materials and operations will be tested and inspected as work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Architect to final acceptance.

- C. The following testing services may be provided by the Owner, at no cost to the Contractor:
1. Review and test of the Contractor's proposed materials for compliance with the specifications.
 2. Review of the Contractor's proposed mix design.
 3. Sampling and testing of materials at plants or stockpiles during the course of the work for compliance with the specifications.
 4. Strength tests of concrete specimens.
 5. Inspection of concrete batching, mixing, and delivery.
- D. The following testing services shall be provided, at the Contractor's expense:
1. Additional testing and inspection required because of changes in materials or proportions, requested by the Contractor.
 2. Additional testing of materials or concrete occasioned by their failure by testing or inspection to meet specification requirements.
- E. At least four standard compression test cylinders shall be made and tested from each day's placement of concrete. Four concrete test cylinders will be taken for every 50 cubic yards of each type and design strength of concrete placed. Two cylinders shall be tested at seven days, and two at 28 days. One additional test cylinder will be taken during cold weather concreting, and will be cured at the job site under the same conditions as the concrete it represents. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.
- F. One slump test will be taken for each set of test cylinders taken.
- G. Submit to the testing laboratory, proposed concrete mix design for review, before beginning work. Forward testing laboratory's mix review to Architect for approval prior to beginning work.
- H. Provide free access to work and full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed for testing agency to take samples for required tests. Notify testing agency and Architect of intent to place concrete at least 24 hours before placement.

PART 2 PRODUCTS

2.1 AGGREGATE BASE COURSE

- A. Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.
1. Material shall be dense graded crushed stone conforming to MHD Specifications Section M2.01.7.

2.2 FORMS

- A. Formwork:
1. For walls identified as smooth finish: Form-Facing Panels for As-Cast Finishes: Smooth Thinform MDO or equal, Steel, glass-fiber-reinforced plastic, high-density overlay,

- Class 1, or better, Finnish phenolic overlaid birch plywood or other approved nonabsorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces in accordance with ACI 303.1. Furnish in largest practicable sizes to minimize number of joints.
2. For walls identified as Formliner finish: Formliner shall be #6010 Random Width and Depth Aged Cedar V-Lite ABS low reuse plastic liner by Custom Rock Formliner 202 West 7th Street, St Paul, MN 55116, customrock.com, Pattern # 1732 Random Reveal by Spec Formliners, Inc. 1038 E 4th Street, Santa Ana, Ca 714-429-9500, www.specformliners.com; or Pattern 16920 Random Wood style Fitzgerald Formliners, 1500 East Chestnut Ave, Santa Ana, CA, 800-547-7760, www.formliners.com
 3. For walls W 22 and W 21 at the larger western children's playground formliner finish shall be CFL-WL008A-F Wildlife Geese Series by Creative Form Liners, Inc. 3411Windhom Road, Brentwood, MD 301-864-3676, www.CreativeFormLiners.com (see drawings for formliner layout of geese); 2/154 Venta by Reckli flexible liner, Reckli.com/en, US contact: Mr. Ray Clark 370 Commerce Boulevard, 30606 Athens Georgia, United States of America; p:706.355.3217; #8036 Circles #1, by Custom Rock Formliner 202 West 7th Street, St Paul, MN 55116, customrock.com or approved equal.
 4. For wall 24 at the smaller eastern children's playground formliner finish shall be CFL-HL007A Homeland Series: Wave Series Large by Creative Form Liners, Inc. 3411Windhom Road, Brentwood, MD 301-864-3676, www.CreativeFormLiners.com; 2/154 Venta by Reckli flexible liner, Reckli.com/en, US contact: Mr. Ray Clark 370 Commerce Boulevard, 30606 Athens Georgia, United States of America; p:706.355.3217; #8036 Circles #1, by Custom Rock Formliner 202 West 7th Street, St Paul, MN 55116, customrock.com or approved equal.
 5. Formwork shall produce an extremely accurate finish as displayed in approved mockup.
 6. Form Sealers: In accordance with ACI 303 Chapter 4, Section 4.8 for each different type of formwork material or liner. Sealers containing oils will not be permitted.
 7. Form Release Agents: In accordance with ACI 303 Chapter 4, Section 4.9 for each different type of formwork material or liner.
 8. Vertical joints shall be expressed with a reveal, therefore formwork shall include a blackout or liner accessory that will produce a recessed joint as indicated on the Drawings.
- B. Concrete Column Forms: Sonotube Concrete Forms, manufactured by Sonoco, 1 North Second Street, Hartsville, South Carolina 29550. Toll Free (888) 875-8754. Website www.sonotube.com. E-mail terry.mckee@sonoco.com.
1. Description: Multiple layers of 100 percent recycled paperboard, spirally wound, and laminated with adhesive.
 2. Interior Surface: Smooth with spiral seam. Moisture barrier plastic coating.
 3. Exterior Surface:
 - a. Sonotube RainGuard – 100 percent recycled paper,
 - b. Sonotube Commercial - Moisture Barrier outer label.
 4. Forms will impart visible spiral mark on concrete columns.
 5. 1-piece, 1-time-use forms.
 6. Recyclable.
 7. Inside Diameter: As indicated on the Drawings.
- C. Forms for Unexposed Finish: Plywood, lumber or metal, with lumber dressed on at least two edges and one side.
- D. Form Ties: Provide prefabricated, adjustable length cone ties, with brackets, cornerlocks and other accessories as necessary. Snap-off ties are not acceptable for areas of exposed concrete finishes.

- E. Form Coatings: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.
- F. Forms shall be true to line and free from warp, and shall be of sufficient strength, when staked, to resist the pressure of the concrete without springing. Formwork shall be designed so that sections may be fastened together to prevent vertical or horizontal movement of ends.

2.3 CONCRETE MIX

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 and the following:
 - 1. Cement shall be Portland cement, conforming to ASTM C 150, Type I or II.
 - 2. Aggregates shall conform to ASTM C 33.
 - a. Normal-Weight Aggregates: ASTM C 33, graded, 3/4-inch (19-mm)] nominal maximum coarse-aggregate size.
 - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
 - 3. Minimum Compressive Strength: 4000 psi (20.7 MPa) at 28 days.
 - 4. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 5. Concrete slump shall be no less than 3 in. nor greater than 6 in., determined in accordance with ASTM C 143.
 - 6. Concrete shall be air-entrained type, conforming to ASTM C 94. Air-Entraining Admixture: ASTM C 260.
 - a. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.

2.4 CONCRETE REINFORCING – See Structural Drawings and Section 033000.

2.5 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.6 CURING MATERIALS

- A. Curing shall be by moist curing or by use of curing compound.
- B. Curing paper shall be a non-staining, fiber reinforced laminated kraft bituminous product conforming to ASTM C 171. Four (4) mil polyethylene sheeting may be substituted for curing paper.
- C. Curing compound shall be a clear compound conforming to ASTM C 309, Type 1 or white pigmented compound conforming to ASTM C 309 Type 2, Class B.

2.7 EXPANSION JOINTS

- A. Unless otherwise indicated on the Drawings, expansion joints shall be 3/8 in. maximum wide.
Expansion joint filler shall be pre-formed, non-bituminous type joint filler conforming to ASTM D 1752, Type II, similar to Sealtight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc.; preformed, non-bituminous type joint filler conforming to ASTM D 1751, similar to Fiber Expansion Joint, manufactured by W.R. Meadows, Inc., or approved equal.
1. Pre-molded filler shall be one piece for the full depth and width of the joint.
 2. Use of multiple pieces of lesser dimensions to make up required depth and width of joint will not be permitted.
 3. Except as otherwise noted on the Drawings, joint filler shall be 3/8 in. thick.
- B. Concrete slab-on-grade shall be doweled at each expansion joint. One end of the dowel shall be greased.

2.8 CONTROL JOINTS (Below grade slabs)

- A. Control joints shall be made by saw cutting.
- B. Unless otherwise indicated on the Drawings, control joints shall be located 10 ft. o.c. maximum.

2.9 BOLTS

- A. Anchor bolts shall conform to ASTM A 307.
- B. Expansion bolts for anchoring into existing concrete shall conform to ASTM A 307, and shall have a self-drilling shell similar to Phillips Red Head Self-Drilling Shells, manufactured by Phillips Red Head Anchor Division of ITT, Michigan City, IN., or approved equal.

PART 3 EXECUTION

3.1 GRADING

- A. Areas to be paved will be compacted and brought approximately to subgrade elevation under Section 31 20 00, EARTH MOVING; before work of this section is performed. Final fine grading, filling, and compaction of subgrade to receive paving, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to Section 31 20 00, EARTH MOVING.
- C. Subgrade of areas to be paved shall be recompacted as required to bring top 8 in. of material immediately below aggregate base course to a compaction of at least 90% of maximum density, as determined by ASTM D 1557, Method D. Subgrade compaction shall extend for a distance of at least 1 ft. beyond pavement edge.
- D. Excavation required in pavement subgrade shall be completed before fine grading and final

compaction of subgrade are performed. Where excavation must be performed in completed subgrade or subbase subsequent backfill and compaction shall be performed as directed by the Architect as specified in Section 31 20 00, EARTH MOVING. Completed subgrade after filling such areas shall be uniformly and properly graded.

- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing pavement.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this section, and material unsuitable for or in excess of requirements for completing work of this Section shall conform to the following:
 - 1. Material shall be legally disposed of off-site.
- H. Prepared subgrade will be inspected and tested by an independent testing agency, provided and paid for by the Contractor, prior to installation of paving base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the specification.
 - 1. Contractor shall submit a minimum of six (6) Proctor compaction test results indicating conformance to compaction density requirements specified herein.

3.2 AGGREGATE BASE COURSE

- A. Aggregate base course for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base course of this type for first class road work, and the following:
 - 1. MHD Specifications Section 405, "Gravel Base Course".
- B. Compaction of aggregate base course shall be to 95% of maximum density as determined by ASTM D 1557, Method D. Stone greater than 2-1/2 in. shall be excluded from course.
- C. Width of base course shall be greater than or equal to the width of pavement surface, if continuous lateral support is provided during rolling, and shall extend at least 2x base thickness beyond edge of the course above, if not so supported.
- D. Aggregate material shall be applied in lifts less than or equal to 6 in. thick, compacted measure. Each lift shall be separately compacted to specified density, using a 6 ton steel wheel roller or vibratory roller equivalent to a 6 ton static roller, or an approved equivalent.
 - 1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.
 - 2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
 - 3. Surface irregularities which exceed 1/2 in. measured by means of a 10 ft. long straightedge shall be replaced and properly compacted.

- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise damaged, shall be cleaned, replaced, and otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

3.3 ACCEPTABILITY OF CONCRETE SURFACES

- A. Concrete structures to receive concrete topping slab shall be inspected to ensure that surface is suitable to receive concrete. Waterproofed surfaces shall be thoroughly cured and suitably protected with protection board prior to start of concrete work of this section.

3.4 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.6 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Forms shall be sufficiently tight to prevent leakage.
- D. Clean forms and adjacent surfaces to receive concrete. Remove debris just before placing concrete.
- E. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.7 EARTH FORMED CONCRETE

- A. Earth formed concrete footings shall be excavated under work of Section 31 20 00, EARTH MOVING to the depth and shape indicated on the Drawings. Earth formed footings shall be continuous.

3.8 REINFORCING

- A. Before being placed in position, reinforcing shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when necessary.
- B. Any bar showing cracks after bending shall be discarded.
- C. Unless otherwise indicated on the Drawings, reinforcing shall extend within 2 in. of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 in.
- D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel and anchors shall be securely wired in the exact position called for, and shall be maintained in that position until concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Architect.

3.9 PLACING CONCRETE

- A. Before placing concrete, forms and space to be occupied by concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint, and other material which might tend to reduce bond.
- B. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.
- C. Concrete which has set or partially set before placing shall not be employed. Retempering of concrete will not be permitted.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 2. If concrete cannot be mechanically consolidated, concrete shall be thoroughly spaded and tamped to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.
- E. Cold-Weather Placement: Comply with ACI 306.1.
- F. Hot-Weather Placement: Comply with ACI 301.
- G. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar scum and laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 in. thick, shall be well scrubbed into thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.10 FINISHING

A. General:

1. Smooth-Formed Finish: Exposed vertical surfaces shall be formed to produce a "smooth form finish", as defined in ACI 301. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair defects as approved by Landscape Architect.
2. Specific patterned formliner finishes should comply with manufacturer photos and details.

- B. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

3.11 FINISHING BELOW GRADE SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

1. Concrete slabs and pads shall be screeded off and finished true to line and grade, and free of hollows and bumps. Surface shall be dense, smooth, and at exact level and slope required.
2. Finished concrete surface for subbases shall be wood-floated to a slightly rough surface. Surface shall not deviate more than 1/4 in. in 10 ft.

- B. Control joints shall be sawn into slab surface. Refer to paragraph 3.14.

- C. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

3.12 PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

- B. It is essential that concrete be kept continuously damp from time of placement until end of specified curing period. It is equally essential that water not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.

- C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

- E. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing compound.
 - 1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.
 - 2. If concrete is cured with a curing compound, compound shall be applied at a rate of 200 sq. ft. per gallon, in two applications perpendicular to each other.
 - 3. Curing period shall be seven days minimum.

3.13 EXPANSION JOINTS

- A. Unless otherwise indicated on the Drawings, expansion joints shall be located at all fixed vertical elements and at a maximum of 30 ft. apart.
- B. Expansion joints shall be 3/8 in. wide and shall be as located on the Drawings. Expansion joints shall be formed in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full depth of the slab. Joint filler shall extend the full length of the expansion joint.
 - 1. Joint filler shall not extend above concrete slab.
 - 2. Depth of joint filler shall be as required to form a 1-1/4 in. deep sealant and backer rod recess below finished concrete surface.
- C. Expansion joints of slab-on-grade shall be doweled. Dowel shall be centered over the joint prior to concrete placement. The end of the dowel at the side of joint which will be poured second shall be greased immediately before concrete placement.

3.14 CONTROL JOINTS

- A. Control joints shall be sawn by using a diamond blade concrete power saw. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab. Saw shall cut into slab at least 1 in., but in no case less than 25% of slab depth.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.16 CHAMFER

- A. Chamfers to be 1/2" Max. and on horizontal wall edges only.

END OF SECTION

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Section 03 45 00
PRECAST ARCHITECTURAL CONCRETE
(TRADE CONTRACT REQUIRED AS PART OF SECTION 04 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Sub-Bid Requirements: As provided under Section 04 00 01 – MASONRY TRADE CONTRACT REQUIREMENTS TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this TRADE CONTRACT includes all individual specification sections listed in Section 04 00 01.

1.2 SUMMARY

- A. Furnish finished and cured, reinforced plant-cast architectural concrete column covers for installation under Section 04 20 00 - UNIT MASONRY.
- B. Installation of items furnished by other Sections (such as anchors, bolts and plates), flashing reglets and to be cast into concrete.
- C. Make provisions in forms for proper location and installation of pipe sleeves, duct openings, keys, chases, electrical boxes, bolts, anchors, inserts, and similar items, as required by other trades. Notify appropriate trades when items noted are ready for installation.

1.3 RELATED REQUIREMENTS

- A. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Structural concrete and concrete housekeeping pads.
- B. Section 04 00 01 – MASONRY TRADE CONTRACT REQUIREMENTS: Trade contract requirements for the work of this Section.
- C. Section 04 20 00 - UNIT MASONRY:
 - 1. Concrete block and brick masonry work.
 - 2. Installation of precast concrete units furnished under this Section 03 45 00.
- D. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural steel framing.
- E. Section 05 31 00 - STEEL DECKING: Metal roof decking.
- F. Section 05 50 00 - METAL FABRICATIONS: Loose lintels, light iron and other miscellaneous metal work.
- G. Section 07 92 00 - JOINT SEALANTS: Sealant and back-up materials.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. ACI 318 - Building Code Requirements for Reinforced Concrete.
 2. ANSI/ASTM A 36 - Structural Steel.
 3. ANSI/ASTM A 185 - Welded Steel Wire Fabric for Concrete Reinforcement.
 4. ANSI/ASTM A 307 - Carbon Steel Externally Threaded Standard Fasteners.
 5. ASTM A 325 - High Strength Bolts for Structural Steel Joints.
 6. ANSI/ASTM A 386 - Zinc Coating on Assembled Steel Products.
 7. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
 8. ASTM A 666 - Stainless and Heat Resisting Chromium-Nickel Steel Sheet Strip, Plate and Flat Bar for Structural and Architectural Applications.
 9. ANSI/ASTM C 31 - Making and Curing Concrete Test Specimens in the Field.
 10. ASTM C 33 - Concrete Aggregates.
 11. ASTM C 143 - Test for Slump of Portland Cement Concrete.
 12. ASTM C 150 - Portland Cement.
 13. ASTM C 260 - Air Entraining Admixtures for Concrete.
 14. AWS - D1.1 - Structural Welding Code.
 15. PCI - Manual For Structural Design of Architectural Precast Concrete.
 16. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
 17. PCI MNL-120 - Design Handbook - Precast and Prestressed Concrete.
 18. All applicable federal, state and municipal codes, laws and regulations for structural concrete

1.5 DESIGN REQUIREMENTS

- A. Design units and all connections and embedded items to design loads as calculated in accordance with 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments, and erection forces.
1. Precast concrete fabricator shall prepare design calculations in accordance with PCI Manual 121, "Manual for Structural Design of Architectural Precast Concrete". The calculations shall be certified, stamped and signed by a Structural Engineer registered in the State where project is located.
 2. Design Loads: Design panels and connections to support total loads including dead loads, live loads, earthquake loads, thermal loads, wind loads and other loads as prescribed by applicable building codes for this project location and by reference standards.
 3. Connection Points: Connect precast to building structure only at locations approved by building structural engineer and as indicated on the approved shop drawings.

- B. Design units to accommodate construction tolerances, deflection of building structural members and clearances of intended openings.
- C. Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable building code.
- D. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's complete product data specifications for portland cement, each admixture proposed to be used, integral colorants, curing compounds, compressible fillers, and other manufactured items.
 - 2. Shop drawings:
 - a. Reinforcement Drawings show: elevations dimensions of concrete, reinforcement clearances; brackets, openings, sleeves or other items furnished by other Sections; and shapes, dimensions, and details of reinforcement and accessories.
 - b. Except as otherwise noted, approval of shop drawings will be for size and arrangement of components. Errors in dimensions shown on shop drawings shall be responsibility of contractor. Check and coordinate cast-in-place concrete work with work of other trades before submitting shop drawings.
 - c. Do not proceed with fabrication of material or performance of work until corresponding item on shop drawing has been approved by the Engineer.
 - 3. Samples:
 - a. Manufacturer's standard samples of integral colorant material, for initial selections by the Architect.
 - b. After receipt of initial approval of the submittals required hereunder, and selections of integral colorants, submit one 12 by 12 by 2 inch piece of each type and finish of architectural concrete for preliminary approval of the Architect.
 - 4. Test Reports: Submit preliminary test results for the Architect's approval at least three weeks prior to the beginning of the work. In addition to the test reports specified under "Quality Control", submit the following from the testing laboratory through the contractor to the Architect:
 - a. Preliminary Design Mix Reports (ACI 301).
 - b. Aggregate Soundness Test Reports (ASTM C 88).
 - c. Aggregate Staining Test Reports (ASTM C 641).
 - d. Air Entrainment Test Reports (ASTM C 260).
- B. Submit maintenance data under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS; indicate surface cleaning instructions.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with PCI MNL-116, PCI MNL-120, PCI Manual For Structural Design of Architectural Precast Concrete,
- B. Welding: ANSI/AWS D1.1.
- C. Design reinforcement under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the Commonwealth of Massachusetts.

1.8 QUALIFICATIONS

- A. Precast Manufacturer and Erectors: Qualified in accordance with PCI MNL-117.
- B. Welders: Employ only experienced welders who are certified for the specific weld processes and positions required and who have been qualified within the preceding 12 months under AWS standard qualification procedure for the type of work required.
- C. Manufacturer to be a member in good standing with the Architectural Precast Association (APA) and operate an APA-certified plant.

1.9 FIELD SAMPLES

- A. Provide field sample under provisions of Section 01 45 00 – QUALITY CONTROL.
- B. Fabricate and erect at site one full size panel, illustrating shape, lifting device, and attachment points, and finish in accordance with approved sample.
- C. Locate where directed by Architect.
- D. Accepted sample may remain as part of the Work.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Handle precast units to position, consistent with their shape and design. Lift and support only from support points.
- B. Lifting or handling equipment: Capable of maintaining units during manufacture, storage, transportation, erection, and in position for fastening.
- C. Blocking and lateral support during transport and storage: Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.
- D. Protect units to prevent staining, shipping, or spalling of concrete.
- E. Mark units with date of production in location not visible to view when in final position in structure.

1.11 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
 - 1. Coordinate the placement of anchorage devices and embedded inserts.

PART 2 - PRODUCTS

2.1 CONCRETE MIX

- A. Concrete materials:
 - 1. Cement: ASTM C 150, Portland Type III - High Early Strength; white color. Use only one brand throughout project.
 - 2. Fine Aggregate: Washed, inert, sand of with color characteristics which when combined with other constituents will produce concrete of specified color. Fine aggregate shall conform to ASTM C33.
 - 3. Coarse Aggregate: Provide aggregate conforming to ASTM C 33. Hard, durable, carefully selected and graded; free of material causing staining or reacting with cement. 3/8" and 3/4" stone of color, type and size gradation to Architect approved sample.
 - 4. Air Entraining Admixture: ASTM C260 as approved by Architect.
 - 5. Water-Reducing Admixture: ASTM C494, Type A, unless otherwise approved by Architect.
 - 6. Water: Clean and not detrimental to concrete.
- B. Design of Concrete Mix
 - 1. Prepare design mixes for each type of concrete required, and obtain the Architect's approval of the proposed design mix. Provide cement and aggregate control to provide two uniform colors of precast concrete.
 - 2. Proportion mixes either by laboratory trial batch or field experience methods, using materials to be employed on the Work for each type of concrete required, and complying with ACI 211.1.
 - 3. Concrete mix: Provide separate back-up and facing mixes or only face mix at fabricator's option.
 - a. General: Comply with ANSI/ACI 301.
 - b. Minimum compressive strength: 5,000 psi (28 day strength)
 - c. Air entrainment: 5 to 7 percent.
 - d. Concrete slump: 3 to 4 inches.
 - e. No calcium chloride will be permitted in mix.
- C. Reinforcing Steel: As engineered by fabricator:
 - 1. ASTM A615, 60 ksi yield grade; deformed billet steel, unfinished, of sizes shown on the approved shop drawings.
 - 2. ANSI/ASTM A 185, welded steel wire fabric; in flat sheets, unfinished, of sizes shown on the approved shop drawings.

3. Tie wire, minimum 16 gage annealed type.

D. Color Additives:

1. Manufacturer: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, the following, or approved equal:
 - a. Davis Colors, Beltsville, MD, 20705, tel. 1-800-356-4848, product: "Davis Colors".
 - b. L.M. Scofield Company, Douglasville, GA, 30134, tel. 770-920-6000, product: "Chromix".
 - c. Bayer Corporation, Pittsburgh, PA, 15205, tel. 800-662-2927, product: "Bayferrox".
2. Materials: Color additives shall contain pure, concentrated mineral pigments specially processed for mixing into concrete, resistant to alkalis and complying with ASTM C979.
 - a. Color additives containing carbon black are not acceptable.
 - b. Provide color as selected by the Architect matching approved samples.
3. Admixtures: Do not use calcium chloride admixtures.

2.2 SUPPORT DEVICES

- A. General: Connecting hardware shall be engineered and designed by the fabricator to accommodate all loads to which it will be subject both in the permanent condition and due to handling. Connection details indicated on the drawings shall be considered minimum required and shall be strengthened as necessary in accordance with design calculations.
- B. Connecting and Support Devices: ASTM A 36 weldable steel, hot dipped galvanized.
 1. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.
 2. Hot-dip galvanizing: Comply with ASTM A 123. Provide thickness of galvanizing specified in referenced standards.
 - a. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.
 - b. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, or aluminum paints is not acceptable.

- C. Bolts, Nuts, and Washers: ASTM A 307, high strength steel chromium nickel steel alloy, except hot dip galvanize those to be embedded into concrete.

2.3 ACCESSORIES

- A. Non-shrink grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.
- B. Bearing Pads: High density plastic, steel, or neoprene (Chloroprene) minimum 1/8 inch thick, smooth both sides.
 - 1. Shims at connections subject to thermal movement or other movement shall be separated with friction reducing pads. Pads shall sufficiently reduce friction to permit movement, shall resist wear, and shall be positively retained in position (open ended slots are not acceptable). Pads shall not be subject to heat damage from welding or cutting, or excessive pressure from over-tightening of bolts.
- C. Recessed Reglets: Stainless steel, lead or zinc, shaped and flanged to remain in place once cast, taped closed to eliminate wet concrete intrusion.

2.4 FABRICATION

- A. Fabrication procedure to conform to PCI MNL-117.
- B. Maintain plant records and quality control program during production of precast units. Make records available upon request.
- C. Use rigid molds, constructed to maintain precast unit uniform in shape, size and finish.
- D. Maintain consistent quality during manufacture.
- E. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.
- F. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items as indicated on Drawings.
- G. Place recessed flashing reglets continuous and straight.
- H. Locate hoisting devices to permit removal after erection.
- I. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- J. Minor patching in plant is acceptable, providing structural, adequacy and appearance of units is not impaired.

2.5 FINISH - PRECAST UNITS

- A. Honed Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.

2.6 FABRICATION TOLERANCES

- A. Maximum Out of Square: 1/8 inch in 10 feet, non-cumulative.
- B. Variation From Dimensions Indicated on approved shop Drawings: Plus or minus 1/8 inch.
- C. Maximum Misalignment of Anchors, Inserts, Openings: 1/8 inch.
- D. Maximum Bowing of Units: Length of bow/360.
- E. Location of Reglets: 1/4 inch from true position.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation of precast concrete units is included under Section 04 20 00 - UNIT MASONRY.

3.2 PATCHING

- A. Patch imperfections as directed, in accordance with ACI 301.

3.3 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.4 PROTECTION

- A. Protect units from damage.
- B. Provide non-combustible shields during welding operations.

End of Section

Section 03 45 01
PRECAST ARCHITECTURAL CONCRETE - SITEWORK

PART 1 GENERAL

1.0 RELATED DOCUMENTS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:
- 01 30 00 – SUBMITTALS
 - 01 43 39 – MOCK-UPS
 - 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
 - 01 40 00 – QUALITY REQUIREMENTS; Testing and inspection.

1.1 DESCRIPTION OF WORK

- A. The work of this Section includes, but is not limited to:
- 1. Architectural precast concrete benches and precast concrete bollards.
 - 2. Structural design, fabrication, and erection of architectural precast units.
 - 3. Connection and anchorage devices.
 - 4. Architectural precast concrete steps**
 - 5. Architectural precast concrete entry sign**
(Add. #3)

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
- 1. Section 06 20 14, EXTERIOR WOOD SEATING
 - 2. Section 07 92 00, JOINT SEALANTS
 - 3. Section 03 30 00, CAST-IN-PLACE CONCRETE

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
- 1. American Concrete Institute (ACI):
 - 318 Building Code Requirements for Reinforced Concrete
 - 347 Concrete Formwork
 - 2. American Institute of Steel Construction (AISC):
 - Code Code of Standard Practice for Steel Buildings and Bridges

3. American Society for Testing and Materials (ASTM):

A 36	Structural Steel
A 82	Steel Wire, Plain, for Concrete Reinforcement
A 123	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 185	Welded Steel Wire Fabric for Concrete Reinforcement
A 239	Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles by the Preece Test (Copper Sulfate Dip)
A 283	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars
A 307	Carbon Steel Externally Threaded Standard Fasteners
A 569	Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality
A 615	Deformed and Plain Billet - Steel Bars for Concrete Reinforcement
A 767	Zinc-Coated (Galvanized) Bars for Concrete Reinforcement
C 33	Concrete Aggregates
C 39	Compressive Strength of Cylindrical Concrete Specimens
C 97	Absorption and Bulk Specific Gravity of Natural Building Stone
C 150	Portland Cement
C 260	Air-Entraining Admixtures for Concrete
C 494	Chemical Admixtures for Concrete

1.5 MOCK-UPS

- A. Prior to commencing primary work of this Section, provide an in-situ mock-up of a full-size precast unit selected by Architect, showing the exterior finish (matrix color, surface color, surface texture), finish, edge treatment, joint treatment, reinforcement, anchorage insert, lifting inserts, wood bench top, and other accessories. Coordinate with wood bench top mockup specified in Section 06 20 14, EXTERIOR WOOD SEATING. Obtain Architect's acceptance of visual qualities. Protect and maintain approved mock-up throughout the work of this Section.
 - 1. Provide additional mock-ups as directed by Architect.
- B. Mock-up Unit: If unit is approved by Architect, it shall be used as the standard of quality for all architectural precast concrete work and wood bench tops. Further installation of the precast work shall not commence until in-place mock-up unit has been approved by Architect. Approved mock-ups will remain as part of the finished work.

1.6 TESTING AND INSPECTION

- A. Testing by Independent Agency: Materials and workmanship furnished under this Section are subject to inspection and testing in plant and field by Architect and an independent testing agency, approved by Architect, selected and paid for by Owner, as specified in Section 01 40 00, QUALITY REQUIREMENTS. Such inspection and testing shall not relieve Precaster of responsibility to furnish materials and workmanship in accordance with requirements of Contract Documents.
- B. The Architect retains the right to inspect placing of concrete; to make slump tests of concrete; and to test concrete cylinder samples for compressive strength. Architect will review materials proposed for use by Precaster, and he may, to extent deemed advisable, inspect batching operations at plant from time to time.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance to erect Category A (Architectural Systems) for non-load-bearing members.
- B. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 - 1. Participates in PCI's plant certification program at time of bidding and is designated a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units or participates in APA's "Plant Certification Program for Production of Architectural Precast Concrete Products" and is designated an APA-certified plant.
- C. Provide precast concrete work conforming to ACI 318, Chapter 16, and PCI MNL-122. Plant quality control program shall comply with PCI MNL-117.

- D. Inspection: Permit the Architect or his authorized representative to conduct unlimited inspections at the precast plant and the site. The Architect or his authorized representative reserves the right to inspect precast units at the plant before shipping, upon delivery to the site, and during and after erection. Precast units may be rejected at any time, even if previously inspected and approved.
- E. Engineering and Design: Provide the services of a Professional Engineer, registered in the Commonwealth of Massachusetts to design, engineer, and certify that the work of this section meets or exceeds the requirements specified in this section. The engineer shall assume professional responsibility for precast and connection design and safety. Design decisions and modifications which affect visual characteristics shall be subject to the approval of the Architect.

1.8 DELIVERY, STORAGE, INSPECTION, AND HANDLING

- A. Precast units temporarily stored at the manufacturer's plant shall be protected from damage in accordance with PCI MNL-116 and PCI MNL-117 and PCI MNL-122. Immediately prior to shipment to the jobsite, all precast concrete units shall be inspected for quality to insure all precast units conform to the requirements specified. Inspection for quality shall include, but shall not necessarily be limited to, the following elements: color, texture, dimensional tolerances, chipping, cracking, staining, warping and honeycombing. All defective precast concrete units shall be replaced or repaired as approved.
- B. Precast units shall be delivered to the site in accordance with delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite all precast units shall be inspected for quality as specified above. If the precast units cannot be unloaded and placed directly into the work, they shall be stored onsite, off the ground and protected from weather, marring, or overload. Precast units shall be handled in accordance with manufacturer's instructions.
- C. Sequence deliveries to avoid delays, but minimize on-site storage.

1.9 PERFORMANCE REQUIREMENTS

- A. Design: Engineer and design architectural precast concrete units to withstand stresses induced by wind loads, live loads, dead loads, temperature, shrinkage, fabrication, handling and erection in accordance with applicable codes. Furnish engineer's certificate stating that precast design meets or exceeds requirements of Contract Documents.

PART 2 PRODUCTS

2.1 MATERIALS AND PRODUCTS

- A. Approved manufacturers for Architectural Pre-Cast Seat walls are:
 - 1. Pre-Cast Specialties Corp., 999 Adams Street, PO Box 86, Abington, MA 02351, p: 781-878-7220; precastspecialties.com
 - 2. MGA Cast Stone, 7 Oxford Homes Lane, PO Bos 207, Oxford, ME 04270, p: 207-539-6035; mgacaststone.com
 - 3. Coral Cast Architectural Stone, 31 Commercial Court, Plainview, NY 11803, p: 516-3875817; coralcast.com

- B. Formwork, General: Comply with applicable requirements of ACI 347, and with PCA Ref. Forms shall be steel of adequate thickness, braced, stiffened, anchored and aligned to produce precast architectural concrete units within required dimensional tolerances. Forms shall be sufficiently rigid to provide dimensional stability during handling and concrete placement and consolidation. Fiberglass-reinforced plastic, plastic coated wood, elastomeric or other nonabsorbptive material shall be used for making tight joints and rustication pieces.
- C. Form Coating: Provide non-staining form release agent that will not interfere with adhesion of sealants, glazing compound, insulation adhesives or applied finishes. Do not use castor oil or form release agents containing castor oil or retardants.
- D. Galvanized Reinforcing Bars: ~~See structural drawings and specifications.~~
1. ~~Size and spacing as indicated on the Drawings.~~
 - a. ~~Standard bench size is eighteen (18) inches deep by twenty eight (28) inches high, width varies; see plans~~
 - b. ~~Amphitheater bench size is twenty four (24) inches deep by eighteen (18) inches tall by forty eight (48) inches long.~~
 - c. ~~Bollard size is eighteen (18) inches deep by twenty eight (28) inches tall by eighteen (18) inches wide.~~
 1. **Standard and Amphitheater Benches: #4 rebar at 16" o.c., 3" clear**
 2. **Bollard: #3 rebar at 12" o.c., 3" clear**
 3. **Steps: #3 rebar at 16" o.c., 3" clear**
 4. **Entry sign: #4 rebar at 16" o.c., 3" clear**
- (Add. #3)
- E. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- F. Welded Wire Fabric: ASTM A 185.
- G. Reinforcing Supports: Provide reinforcing supports, including bolsters, chairs, spacers, and other devices for fastening, spacing, and supporting reinforcing.
- H. Concrete Materials: Provide normal weight, 28 day 5,000 psi minimum compressive strength concrete with 4% to 6% total air content. Provide concrete materials as follows:
1. Portland Cement: ASTM C 150, Type I or Type III. Use only one brand, type, color, and source of cement throughout the Project.
 2. Cement Color:
 - a. Provide standard grey Portland Cement.
 - b. Provide white Portland Cement for facing concrete mix if required to match Architect's sample.
 3. Water: Clean, clear, potable and free from deleterious chemicals and substances.
 4. Course Aggregate: ASTM C 33, specially selected for color, supplied from a single source for entire Project. Provide aggregate washed, clean, hard and durable, inert, material, free of staining or deleterious material. Provide aggregate color as required to match Architect's sample.
 5. Fine Aggregate: ASTM C 33 manufactured sand of same material as course aggregate, unless approved otherwise by Architect. Provide aggregate color as required to match Architect's sample.
 6. Air-Entraining Admixtures: ASTM C 260, manufacturer and product as Approved by Architect.
 7. Water Reducing Admixture: ASTM C 494, Type A, manufacturer and product as Approved by Architect.

- I. Connection and Erection Materials: Provide ASTM A 36 and ASTM A 283 steel shapes and plate. Provide ASTM A 569 and A 307 bolts as indicated on approved shop drawings.
 - 1. Hot dip galvanize all connection and erection materials after fabrication in compliance with ASTM A 123 and A 153. Provide minimum 1.5 oz./ft² zinc coating.
 - J. Stainless Steel Dowels and Shapes: AISI Type 302/304.
 - K. Slotted Inserts: Heavy malleable iron inserts with a depth of not less than 2-1/2 in. and a length of 4-1/2 in., with 3/4 in. steel nuts, hot-dip galvanized in accordance with ASTM A123.
 - L. Threaded Inserts: Malleable iron, with 3/4 in. sound standard threaded steel bolts, unless otherwise shown on Drawings, hot-dip galvanized in accordance with ASTM A 123.
 - M. Lifting Devices: Design and place lifting devices so as not to weaken unit during manufacture and handling.
 - N. Anchors: Design and place anchors to permit proper installation without forcing. Do not induce or superimpose any undue loads or stresses onto other work. Design anchors to allow for leveling, plumbing and positioning of precast units to accepted tolerances in structural steel as defined by AISC Code.
 - O. Plastic Washers and Shims: Multipolymer plastic material with a minimum compressive strength of 8,000 psi, equal to Korolath, manufactured by the Koro Corporation, or approved equal.
 - P. Neoprene Bearing Pads: 70 durometer hardness.
 - Q. Shims: 3/8" plastic masonry shims
 - R. Precast concrete benches and bollards**
 - 1. **Standard bench: 1'-6"W x 1'-10"H x 4'-0"L**
 - 2. **Amphitheater bench: 2'-0"W x 1'-8"H x 4'-0"L**
 - 3. **Bollard: 1'-6"W x 1'-6"W x 1'-10"H**
 - S. Precast steps (at amphitheater)**
 - 1. **Lower steps: 9" H x 2'-0" W x 4'-0" L**
 - 2. **Upper step: 7" H x 1'-0" W x 4'-0" L and 7" H x 1'-0" width x 2'-0" L**
 - T. Entry sign**
 - 1. **5'-0" H x 1'-4" W x 10'-0" L**
 - 2. **Board form finish**
 - 3. **Recess for inset LED sign**
 - 4. **Conduit for LED sign and lighting**

(Add. #3)
- 2.2 CONCRETE MIX
- A. Submit proposed concrete mix proportions to Architect for approval prior to fabrication. Show batch weights, gradations, specific gravity, absorption of aggregates, slump, fresh unit weight, and air content. Verify mix design and provide four compression tests, two at 7-days, and two at 28 days, on 6 in. diameter x 12 in. high cylinders filled with proposed mix materials in proposed proportions.

- B. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each type of concrete required, complying with ACI 318.
- C. Adjustment to Concrete Mixes: Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test result, or other circumstances warrant.
- D. Admixtures: Use admixtures in strict compliance with manufacturer's instructions. Adjust admixture quantities as required to maintain quality control.

2.3 COLOR ADMIXTURE

- A. Color admixture shall meet or exceed the requirements set by Portland Cement Association (PCA) and ASTM C 91, C 270 and C 494. Contractor to submit color options for approval.
- B. Color admixture shall not affect workability, setting, or strength of concrete adversely. Color pigments shall consist of chemically inert, non-fading, alkali-fast mineral oxides, finely ground and prepared for use in cement and mortar. Admixture shall not contain calcium chloride.
- C. Color admixture shall be determined by approval of architect and client. Submit sample
- D. Mix design shall conform to manufacturer's recommendations, and directions of the Architect to achieve proposed color. Strictly monitor additive/cement ratio throughout job to ensure uniform color.

2.4 FABRICATION

- A. General: Design and fabricate precast concrete units to comply with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-117, unless otherwise indicated.
- B. Fabricate units straight, smooth, and true to size and shape, with exposed edges and corners precise and square unless otherwise indicated.
- C. Built-In Items: Provide reglets, slots, holes, embeds, anchors, and other accessories in units to receive cramps, dowels, reglets, waterstops, flashings, light fixtures and other similar work as indicated. Provide all necessary cast in embeds and anchors.
- D. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
 - 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to galvanized reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and coat bar ends after cutting.
 - 2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 - 3. Place reinforcement to maintain at least 3 in. minimum coverage. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

4. Unless otherwise indicated on the Drawings, place No. 4 rebar every 12 in. on center, both ways.
- E. Anchorages: Provide Type 304 stainless steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other miscellaneous steel shapes not provided by other trades, necessary for securing precast units to supporting and adjacent members.
 1. Design and provide items to be embedded in and attached to other work. Design and engineer support systems to support precast units.
- F. Repairs: Surface defects may be repaired when acceptable to the Architect and when indistinguishable in finish, color, texture and quality from acceptable unrepaired surfaces. Demonstrate repair techniques, including curing; obtain Architect's approval of repair results before continuing work. Replace units that cannot be repaired as directed.
 1. Determine repair mix formulas by trial to obtain finish, color, and texture match when both repaired and acceptable unrepaired concrete are cured and dry.
 2. Fill holes, if any, using the same source of cement, sand, and pigment used in the parent concrete.
 3. Moist cure repaired units for 7 days. Keep units continually damp by covering with damp flannel and polyethylene. Do not wash out repair mortar.
- G. Predelivery Cleaning: Clean objectionable stains or spots off units as directed by the Architect using brushes, soap and clean, running water before delivery to site. Acid cleaning is not acceptable unless approved by Architect.
- H. Identification: Mark each unit on a surface concealed from view in final installation with a non-staining, non-migrating paint. Coordinate marking with approved erection drawings.

2.5 FINISH -

- A. Light Blast Finish: Provide light sand blast finish lightly exposing fine aggregate with no reveal, as on Architect's approved selection and verification samples, and approved mockup installation.
 1. Finish shall be free of surface defects such as migrated entrained air or entrapped air bubbles over 1/8 in. diameter, sand streaks, staining, lack of uniformity of color or finish, blotches, wash, form leakage or honeycomb, and physical damage, any of which shall be deemed cause for rejection.
- B. All edges to have 3/8" chamfer.
- ~~C. All edges shall be eased 90 degrees, with no chamfer.~~
- C. **Eased Edges:**
 1. **Benches and bollards to have 3/8" chamfer on all edges.**
 2. **Steps to have 1" radius at leading edge** (Add. #3)

2.6 DRAIN BOARD -

- A. Enkamat drain board or equivalent behind amphitheater benches

~~2.7 DIMENSIONS~~

- ~~A. Standard Bench: 1' 6"w x 1' 10"h x 4' 0"L~~
- ~~B. Amphitheater Bench: 2' 0"w x 1' 8"h x 4' 0"L~~
- ~~C. Cube bollard: 1' 6"w x 1' 10"h x 1' 6"L (Add. #3)~~

PART 3 EXECUTION

3.1 INSPECTION

- A. The Installer/Erector shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning of installation means Installer accepts substrates and conditions.

3.2 INSTALLATION

- A. Do not install precast units until concrete has attained its design compressive strength.
- B. Precast units shall be erected in accordance with the detail drawings and without damage to other units or to adjacent members. Units shall be set true to alignment and level, with joints properly spaced and aligned both vertically and horizontally. Erection tolerances shall be in accordance with the requirements of PCI MNL-117 and PCI MNL-122. As units are being erected, shims and wedges shall be placed as required to maintain correct alignment. Pickup points, boxouts, inserts, and similar items shall be finished to match adjacent areas after erection. Erection of precast units shall be supervised and performed by workmen skilled in this type of work.
- C. Accessories: Install clips, hangers, and other accessories required for erection of precast units to supporting members and back-up materials.
- D. Remove temporary shims, wedges, and spacers as soon as possible after anchoring is completed.

3.3 GENERAL ACCEPTANCE CRITERIA

- A. Units shall meet specifications. No structural deficiencies, cracks, loose inserts or anchors, exposed steel, steel with less than 1 in. minimum cover, or other defects shall be permitted.
- B. Appearance Acceptance Criteria: When viewed at a distance of 10 ft. in natural daylight, exposed surfaces shall be uniform in color, texture, and finish shall be within the range of approved mock-up samples when compared side by side. Panel edges and details of decoration shall be clear, well defined and true to line within specified alignment tolerances. Following is a list of finish defects which are unacceptable and cause for rejection of panels:
 - 1. Ragged or irregular edges.
 - 2. Excessive air voids, commonly called bugholes, evident on exposed surface.
 - 3. Adjacent flat, round and return surfaces with a greater difference in exposure than the approved samples.
 - 4. Casting lines evident from different placements.
 - 5. Visible form joints or irregular surfaces.
 - 6. Rust stains on panel surfaces.
 - 7. Wall sections not matching approved sample or non-uniformity of color within a section or in adjacent wall sections due to areas of variable aggregate concentration and variations in depth of exposure.
 - 8. Blocking stains or acid stains evident on panel surface.
 - 9. Non-uniformity of textures or color.
 - 10. Areas of backup concrete bleeding through the facing concrete.
 - 11. Foreign material embedded in the face.
 - 12. Visible repairs.
 - 13. Reinforcement shadow lines.

- 14. Visible cracks.
- 15. Telegraphing of form lines such as plywood grain.

3.4 CLEANING

- A. Not sooner than 72 hours after installation, faces and other exposed surfaces of precast concrete discolored during erection shall be cleaned to remove dirt and stains by dry scrubbing with a stiff fiber brush, wetting the surface and vigorous scrubbing of the finish with a stiff fiber brush followed by additional washing, or by chemical cleaning compounds such as detergents or other commercial cleaners. Commercial cleaners shall be used in accordance with the manufacturer's recommendations. Cleaning procedure shall be performed on a designated test area and shall be approved prior to proceeding with cleaning work. Discolorations which cannot be removed by these procedures, will be considered defective work. Cleaning work shall be done when temperature and humidity permit surfaces to dry rapidly. Adjacent surfaces shall not be damaged during cleaning operations.

3.5 DEFECTIVE WORK

- A. Precast concrete units damaged during erection shall be repaired as soon after occurrence as possible or replaced, as directed, using approved procedures. All repairs to precast concrete units shall match the adjacent surfaces in color and texture and shall be as approved. Unless otherwise approved, repair procedures shall conform to PCI MNL-116 and PCI MNL-117.

END OF SECTION

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Section 03 54 00
CAST UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish, place, cure, and protect cementitious underlayment over concrete slabs, as shown on the drawings.
- B. Furnish and install perimeter joint filler.

1.2 RELATED REQUIREMENTS

- A. Section 01 73 29 - CUTTING AND PATCHING: Procedural and administrative requirements for cutting and patching.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ACI 302 - Guide for Concrete Floor and Slab Construction.
 - 2. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - 3. ASTM C 33 - Concrete Aggregates.
 - 4. ASTM C150 - Portland Cement.
 - 5. ASTM C 1708 – Self-leveling Mortars Containing Hydraulic Cements.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature:
 - a. Manufacturer's complete product data specifications, methods of mix design.
 - b. Manufacturer's complete product data for admixtures proposed to be used, curing compounds, and other manufactured items.
 - 2. Manufacturer's installation instructions: Indicate product installation criteria, environmental and curing requirements.

1.5 QUALITY ASSURANCE

- A. Applicator specializing in applying the work of this Section with a minimum of 3 years successful experience, and as acceptable by underlayment manufacturer.
- B. Mixing and application equipment as approved by the manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original undamaged packages or acceptable bulk containers.
- B. Store materials inside, under cover, and in manner to keep them dry, protected from weather, freezing temperatures, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- C. Do not use underlayment materials which show indications of moisture damage, caking, or other signs of deterioration.

1.7 ENVIRONMENTAL CONDITIONS

- A. Do not place cementitious underlayment when ambient temperature is below freezing.
- B. When air temperature has fallen or is expected to fall below 40 degrees. F (4 degrees. C), heat water and aggregates before mixing to attain concrete at point of placement with temperature of 50 degrees. F (10 degrees. C), 80 degrees. F (27 degrees. C) max.
- C. Do not place concrete underlayment on surfaces which are covered with standing water, snow, or ice.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Ardex Americas, Aliquippa, PA.
 - 2. Maxxon Corporation, Hamel MN,
 - 3. Quikrete Company, Atlanta GA.
 - 4. Silpro Masonry Systems Inc., Ayer MA.

2.2 CEMENTITIOUS UNDERLAYMENT

- A. Underlayment:
 - 1. Ardex, product "Ardex K-15".
 - 2. Maxxon Corporation, product "LevelRight Plus".
 - 3. Quikrete Company, product "Self-Leveling Floor Resurfacer", number 1249-50.
 - 4. Silpro Masonry Systems Inc., product: "Silflo 220".
- B. Primer: As recommended by underlayment manufacturer for intended substrate.
- C. Aggregate: Well graded, washed gravel (1/8 inch to 1/4 inch or larger) for use when underlayment installed thickness shall be greater than 1-1/2 inch thick.

- D. Water: Clean potable and cooler than 70 degrees Fahrenheit.
 - 1. Use minimum amount of water necessary to produce a workable mix.

2.3 ACCESSORIES

- A. Perimeter Joint Filler: Glass fiber strips, compressible to 50 percent original thickness under load of 25 pounds per square inch with full recovery. Conforming to ASTM C612, Class 2

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that deck surface is suitable to receive work of this Section.

3.2 PREPARATION

- A. Prepare existing concrete with steel brush cleaning, remove all loose and chipped existing concrete and applying bonding agent (primer) in accordance with manufacturer's instructions.
 - 1. Surfaces to receive underlayment shall be free of sealers, dirt, oil, grease, or other contaminants.
 - 2. Unless substrate or other surface preparation method is approved by manufacturer, surface shall be shotblasted prior to application of bonding agent (primer).
- B. Control Joints: Install control joints at junctures with vertical surfaces, including curbs, walls, and vents, for full depth of underlayment.
- C. Install expansion joint filler at:
 - 1. Perimeter of decking,

3.3 APPLICATION

- A. Place concrete underlayment in accordance with manufacturer's instructions, using equipment and procedures to avoid segregation of mix and loss of air content. Deposit and screed in a continuous operation until an entire section is completed, apply as continuously as possible following recommendations of manufacturer.
 - 1. Finish surface shall be smooth and level to within a tolerance of 1/8 inch when measured with a 10 foot straight edge.
 - 2. Leave top surface in acceptable condition to receive subsequent finishes.
- B. Air cure in accordance with manufacturer's instructions.

3.4 DEFECTIVE UNDERLAYMENT

- A. Defective Underlayment: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Refinish or remove and replace underlayment surfaces which are too rough to receive finish roofing or where physical properties do not meet specified requirements, as determined by Architect.

- C. Repair or replacement of defective underlayment will be determined by the Architect.

End of Section

Section 04 00 01
MASONRY TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.
1. Specification requirements for the Trade Contract "Masonry" include all the following listed Specification Sections, in their entirety:
 - a. Section 03 45 00 – PRECAST ARCHITECTURAL CONCRETE
 - b. Section 04 20 00 – UNIT MASONRY
 - c. Section 04 73 13 – CALCIUM SILICATE MANUFACTURED STONE MASONRY
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 04 00 01 – MASONRY TRADE CONTRACT REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
 2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the

Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.
 2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3,

P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.

3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 QUALITY ASSURANCE

- A. Company specializing in work described in the above listed individual specification Sections with minimum 5 years documented experience.

1.5 SEQUENCING

- A. Phasing: Refer to Section 01 10 00 - SUMMARY, and Drawings for phasing and milestone completion requirements which affect the Construction Manager's Work

and the Work of this Trade Contract. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

- A. General: Masonry Trade Contractor shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work and all other Work requiring such equipment as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor.
 - 2. Masonry Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
 - 4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.2 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 – EXECUTION

3.1 SITE MAINTENANCE

- A. The Masonry Trade Contractor shall furnish and maintain dumpsters as required to adequately control the disposal of all trash, construction debris, and waste materials resulting from the work of this Trade Contract.
 - 1. The Masonry Trade Contractor is responsible for all costs to obtain, maintain and disposal of dumpsters.
 - 2. Disposal: Empty dumpsters on frequent regular basis as necessary to prevent overflow spillage. Legally dispose of waste off-site.
- B. Daily clean work areas. Sweep and place into the dumpster(s) furnished by this trade, all pallets, construction debris, unused masonry materials, and other waste materials resulting from the Work of this Trade Contract.
- C. After completion of the work of this Section, remove equipment, tools, and unused materials, remove all remaining waste materials and construction debris related to the work of this Trade Contract. Clean all wall, partition, and floor areas completely free from deposits of mortar, wash down residues and materials installed under this Section.

End of Section

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Section 04 20 00
UNIT MASONRY
(TRADE CONTRACT REQUIRED AS PART OF SECTION 04 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract: As provided under Section 04 00 01 – MASONRY Trade Contract REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 04 00 01.

1.2 SUMMARY

- A. Furnish and install:
1. Brick masonry Type 1 veneer construction for exterior walls backed by structural light gage metal framing, concrete unit masonry and concrete foundations.
 2. Brick masonry Type 1A thin brick construction for interior walls including metal spacing grid, adhesives and mortar.
 3. Pointing of brick after installation.
 4. Field applied anti-graffiti coating at Masonry Types 1 and 1A.
 5. Concrete masonry unit construction for exterior wall and interior partitions.
 6. Concrete masonry unit construction for elevator shafts.
 7. Grout fill for hollow elevator hoistway and wherever ties or anchorage items occur, and as further indicated in the Drawings.
 8. Furnish and install rebar at elevator frames.
 9. Reinforcing, ties, anchors, and other metal accessories, for anchoring unit masonry together and to other materials.
 10. Compressible joint fillers for control joints in unit masonry work and joints with structural steel.
 11. Built-in metal and membrane masonry flashing.
 12. Semi-rigid insulation system in cavity wall masonry veneer construction including insulation, adhesives for attachment to air/vapor barrier membrane, retention washers at masonry veneer anchors, and related accessories.
 13. Control and expansion joints in masonry construction.
 14. Mortar stop netting to hold mortar droppings and prevent blockage of weep hole vents.
 15. Through wall flashing termination bar and sealant at brick shelf.
 16. Continuous sealant between metal through wall flashing fastening location and air vapor barrier.
 17. Installation of masonry anchors and accessories furnished by other trades.

18. Installation of door frames and access doors furnished by other trades located in masonry walls.
 19. Sealant at adjustable veneer anchor plate fastener penetrations.
 20. Sealant at edges of through wall flashing membrane.
 21. Sealant under metal through wall flashing to masonry.
 22. Sealant at metal through wall flashing lap joint splice.
 23. Masonry welding couplers at structural steel related to masonry.
 24. Metal through wall flashing termination and lap joint splices including edge sealant.
 25. Mock-up wall components.
 26. EPDM membrane through wall flashing at expansion joint in metal through wall flashing.
 27. Grout fill behind brick masonry below grade.
 28. Through wall flashing termination bars at concrete masonry unit and brick shelves.
- B. Place, install and build-in, as work progresses, the following products and materials furnished under the indicated Sections:
1. Anchor bolts, wood blocking, and anchorage items furnished or set by other trades as specified in individual Sections.
 2. Precast concrete column covers as specified under Section 03 45 00 – ARCHITECTURAL PRECAST CONCRETE.
 3. Cast simulated masonry unit panels and trim pieces as specified under Section 04 73 13 - CALCIUM SILICATE MANUFACTURED STONE MASONRY.
 4. Brick support channel with anchor bolts, nuts and washers at roofs furnished by Section 05 12 00 – STRUCTURAL STEEL.
 5. Hoist beam for elevator furnished by Section 05 12 00 – STRUCTURAL STEEL.
 6. Loose steel lintels at door, window, ductwork and similar openings in interior masonry partitions. Hot dipped galvanized and epoxy primed loose lintels and head/jamb assemblies at door, louver, window and similar openings in exterior masonry partitions; Elevator hoist beam; Anchor bolts, with nuts and washers; inserts and sleeves required to attach miscellaneous metal items to masonry, for installation under Section furnished under Section 05 50 00 – METAL FABRICATIONS
 7. Access door frames furnished by Section 08 31 00 - ACCESS DOORS AND PANELS or by section requiring the same.
 8. Elevator guide rail brackets and inserts furnished by Section 14 24 24 – HOLELESS HYDRAULIC ELEVATOR.
 9. Sleeves in masonry construction provided by other trades
 10. Hollow metal door frames furnished by Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES or by section requiring the same.
- C. Furnish the following items for installation under related sections:
1. 20 oz. stainless steel through wall flashing 2-piece (counterflashing) for installation over PVC flashing termination under Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING.

- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 45 00 - QUALITY CONTROL: Perform testing of masonry, mortar and grout specified herein.
- C. Section 01 45 29 - TESTING LABORATORY SERVICES: Perform testing of masonry, mortar and grout specified herein.
- D. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- E. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- F. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- G. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- H. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.

- I. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete foundation work, walls and slabs.
- J. Section 04 00 01 - MASONRY TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- K. Section 04 73 13 - CALCIUM SILICATE MANUFACTURED STONE MASONRY UNITS: Manufactured stone units furnished and installed as part of this Trade Contract.
- L. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Welding of masonry anchors to structural steel. Furnishing brick support channel with anchor bolts, nuts and washers at roofs for installation under this Section.
- M. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural light gage metal framing for support of masonry veneer.
- N. Section 05 50 00 - METAL FABRICATIONS: Steel lintels and head/jamb assemblies at masonry openings, elevator hoist beam; anchor bolts, with nuts and washers; inserts and sleeves required to attach miscellaneous metal items to masonry for installation as part of this Section 04 20 00.
- O. Section 06 10 00 - ROUGH CARPENTRY: Setting and temporary bracing of hollow metal frames occurring in masonry, and removal of temporary centering when frames have been built into the masonry.
- P. Section 06 16 00 - SHEATHING: Wall sheathing at masonry veneer walls.
- Q. Section 07 26 00 - VAPOR RETARDERS:
 - 1. Vapor barrier, seam tape, pipe boots, termination bars, termination mastic, detail strip for installation under concrete slabs on grade.
- R. Section 07 27 13 - MEMBRANE AIR BARRIERS: Self-adhesive elastomeric sheet membrane wall vapor-permeable air and vapor barrier system, including specified sheet membrane, required primers and adhesives.
- S. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING.
- T. Section 07 84 00 - FIRESTOPPING.
- U. Section 07 92 00 - JOINT SEALANTS: Sealant, caulking materials, and compressible joint bead back-up, in conjunction with masonry work.
- V. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.
- W. Section 28 31 11 - ADDRESSABLE FIRE ALARM SYSTEM: Fire department access emergency key cabinets mounted to exterior wall.

1.5 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American Concrete Institute (ACI) and American Society of Civil Engineers (ASCE): ACI 530.1/ASCE 6 - "Specifications for Masonry Structures"
2. ASTM A 82 - Steel Web, Plain, for Concrete Reinforcement.
3. ASTM A 123 - Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
4. ASTM A 153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A 497 - Welded Wire Fabric; Deformed, for Concrete Reinforcement.
6. ASTM A 615 - Deformed and Plain Billet-Steel Bar for Concrete Reinforcement.
7. ASTM A 641 - Zinc-Coated (Galvanized) Carbon Steel Wire.
8. ASTM B 117 - Salt Spray (Fog) Testing.
9. ASTM B 633 - Electrodeposited Coatings of Zinc on Iron and Steel.
10. ASTM C 5 - Quicklime for Structural Purposes.
11. ASTM C 55 - Concrete Building Brick.
12. ASTM C 62 - Building Brick.
13. ASTM C 67 - Sampling and Testing Brick and Structural Clay Tile.
14. ASTM C 90 - Load-Bearing Concrete Masonry Units.
15. ASTM C129 - Non-Load Bearing Concrete Masonry Units.
16. ASTM C 140 - Method of Sampling and Testing Concrete Masonry Units.
17. ASTM C 144 - Aggregate for Masonry Mortar.
18. ASTM C 150 - Portland Cement.
19. ASTM C 207 - Hydrated Lime for Masonry Purposes.
20. ASTM C 216 - Facing Brick.
21. ASTM C 270 - Mortar for Unit Masonry.
22. ASTM C 387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.
23. ASTM C 404 - Aggregates for Masonry Grout.
24. ASTM C 476 - Grout for Masonry
25. ASTM C 514 - Water Penetration and Leakage Test to Assess Performance of Integral Water Repellent Admixtures.
26. ASTM C 595 - Blended Hydraulic Cement.
27. ASTM C 652 - Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
28. ASTM C 778 - Specification for Standard Sand.
29. ASTM C 780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
30. ASTM C 954 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs.
31. ASTM C 1019 - Method of Sampling and Testing Grout.
32. ASTM C 1072 - Method for Measurement of Masonry Flexural Bond Strength.
33. ASTM C 1093 - Standard Practice for Accreditation of Testing Agencies for Masonry.
34. ASTM C 1329 - Standard Specification for Mortar Cement.

35. ASTM C 1357 – Test Methods for Evaluating Masonry Bond Strength.
36. ASTM D 2000 - Classification System for Rubber Products.
37. ASTM D 2287 - Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
38. ASTM E 119 - Fire Tests of Building Construction and Materials.
39. ASTM E 447 - Compressive Strength of Masonry Prisms.
40. ASTM E 488 - Strength of Anchors in Concrete and Masonry Elements.
41. ASTM E 518 - Test Method for Flexural Bond Strength of Masonry.
42. American National Standards Institute Building Code requirements.
43. MCAA – Hot and Cold Weather Masonry Construction.
44. NFPA 285 (National Fire Protection Association): Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

- B. The following reference materials are hereby made a part of this Section by reference thereto:
1. UL Fire Resistance Directory.
 2. BIA applicable Technical Notes, Research Reports and Standards, including, but not limited to the following
 - a. BIA Research Report Number 15 – Causes and Control of Efflorescence in Brickwork.
 - b. BIA Technical Notes, Number 20 - Cleaning Brick Masonry.
 3. IMI: Masonry Construction Guide Manual.
 4. PCA, "Concrete Masonry Handbook".
 5. NCMA applicable TEK Bulletins.
 6. NCMA TEK Bulletin N°. 45 - Removal of Stains from Concrete Masonry Walls.

1.6 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

1.7 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 2. Material certificates: Provide for the following, signed by manufacturer and Contractor certifying that each material complies with requirements.
 - a. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 - b. Each material and grade indicated for reinforcing bars.
 - c. Each type and size of joint reinforcement.
 - d. Each type and size of anchors, ties, and metal accessories.
 3. Material test reports from a qualified independent laboratory employed and paid by Contractor indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
 - a. Mortar complying with the property requirements of, and tested in accordance with ASTM C 270.
 - b. Mortar complying with the proportion requirements of ASTM C 270 and tested in accordance with ASTM C 780.
 - c. Grout mixes: Include description of type and proportions of grout ingredients.
 - d. Masonry units; report for tests performed within the previous six months.
 4. Provide an independent Evaluation Report as the manufacturer's documentation confirming materials have been evaluated and conform to the requirements of NFPA 285 based on the various exterior wall configurations for this project.
 5. Provide compatibility letters from each manufacturer for all components stating that flashing materials are compatible with air and vapor barrier and wrap specified in other Sections.
 6. Provide welding certificates for all welders who will be working on this project.
 7. Shop drawings:
 - a. Provide elevations and details of masonry work showing jointing patterns, reinforcing and coursing; indicate locations of expansion and control joints.
 - b. Provide rebar detailing if additional to what is noted on the Drawings.
 8. Verification samples:
 - a. Samples of each masonry accessory or anchorage item required.
 - b. Brick masonry units.
- B. LEED Submittal Requirements:
1. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 2. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.

3. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
4. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.8 QUALITY ASSURANCE

- A. Single-source responsibility for facing units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
- B. Single-source responsibility for concrete masonry units: Obtain concrete masonry units for the project from a single manufacturer.
- C. Single-source responsibility for mortar materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
- D. Single source responsibility for prepackaged mortar materials: Obtain masonry cement or masonry mortar from a single manufacturer. Where colored mortar is required provide batch tickets confirming all materials are from a single production run to ensure uniformity of the mix.
- E. Inspection, Testing, and Quality Control: A program of Inspection and Testing of structural masonry work will be established by the Structural Engineer of Record (SER) who will direct the implementation of tests as carried out by an independent testing agency. All costs for inspection and testing will be borne by the Owner.

1.9 REGULATORY REQUIREMENTS

- A. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.
- B. Fire performance characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

1.10 MOCK-UPS

- A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, and relationship to other work.

1.11 PRE-INSTALLATION CONFERENCE

- A. At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
1. Required attendees: Architect, Contractor, Mason's Project Superintendent, and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - a. Section 03 30 00 – CAST-IN-PLACE CONCRETE.
 - b. Section 05 12 00 – STRUCTURAL STEEL FRAMING.
 - c. Section 05 40 00 – COLD FORMED METAL FRAMING
 - d. Section 05 50 00 – METAL FABRICATIONS.
 - e. Section 06 10 00 – ROUGH CARPENTRY.
 - f. Section 06 16 00 – SHEATHING.
 - g. Section 07 27 13 - MEMBRANE AIR BARRIERS.
 - h. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING.
 - i. Section 07 62 00 – SHEET METAL FLASHING AND TRIM.
 - j. Section 07 92 00 – JOINT SEALANTS.
 - k. Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES.
 - l. Section 08 43 13 – ALUMINUM-FRAMED STOREFRONTS.
 - m. Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS.
 - n. Section 08 51 13 – ALUMINUM WINDOWS.
 2. Agenda:
 - a. Scheduling of masonry operations.
 - b. Review of staging and material storage locations.
 - c. Coordination of work by other trades.
 - d. Protection of completed Work.
 - e. Establish weather and working temperature conditions to which Architect and Contractor must agree.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. General: Do not deliver cement, lime, and similar perishable materials to the site until suitable storage is available. Store such materials in weatherproof structures, and ensure that materials are in perfectly fresh condition when brought for use. Protect masonry units and manufactured products of all types from wetting by rain or snow, and keep covered when not in use.
- B. Masonry Face Units: Handle all masonry units carefully in transit and on the site, so as to keep units whole, with edges sharp, and faces clean and undamaged. Deliver all masonry units on pallets; or handle units individually, and properly stack same.
- C. Aggregates: Deliver, store and handle aggregate materials so as to prevent contamination with earth or other foreign materials.

1. Store cement, lime, sand and similar products under cover and from direct contact with earth or floor slabs.
- D. Manufactured items: Deliver manufactured products in original containers plainly marked with product identification and manufacturer's name.
1. Store metal accessories and the like under cover and from direct contact with ground, and in manner to prevent rust.
- E. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or which show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.13 ENVIRONMENTAL CONDITIONS

- A. Hot and cold weather requirements shall be in accordance with the recommendations of the Masonry Industry Council as contained in the document "*HOT AND COLD WEATHER MASONRY CONSTRUCTION*" published by the MCAA (Masonry Contractor's Association of America). Enforcement for these requirements shall take place under the following conditions which modify those in the referenced document.
1. The recommended hot weather requirements for 100 degrees Fahrenheit (37.8 degrees Celsius) shall be enforced for this project when ambient temperatures are above 90 degrees Fahrenheit (32.2 degrees Celsius) under all wind conditions including zero velocity.
 2. Cold weather requirements shall be enforced when ambient temperatures fall below 40 degrees Fahrenheit (4.4 degrees Celsius).

1.14 COORDINATION

- A. Coordinate work with that of other trades which require placement and building-in of, as work progresses, anchor bolts, wood blocking, hollow metal frames, aluminum storefront, curtain wall and window units, and anchorage items.
- B. Examine all Drawings as to requirements for the accommodation of work of other trades. Provide all required recesses, chases, slots, and cutouts. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take every precaution to minimize future cutting and patching. Closely coordinate the location and placement of such items.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering brick masonry products which may be incorporated in the work include the following or approved equal:
1. Interstate Brick, Ogden, UT.
 2. Taylor Clay Products, Inc., Salisbury, NC.
 3. Glen Gery Corporation, Wyomissing, PA.

2.2 BRICK UNITS

A. General:

1. Provide corner-brick with two faces to match brick wall finish.
2. Provide special shapes as indicated on Drawings and for applications where forms, size or finish cannot be produced from standard shapes. Do not expose cores or unfinished surfaces.
 - a. At all interior exposed to view masonry provide radiused outside corners at all locations.
3. Provide solid (not cored) brick units for:
 - a. All cut-to-size brick and special shapes,
 - b. At window and door jambs,
 - c. At steel lintel locations.
 - d. Lipped stretchers at lintels.
 - e. Radiused corner units at masonry walls.

B. Facing brick: ASTM C 216, Type FBS Grade SW, in size, texture and color to match Architect's samples.

1. Brick size: 3-9/16 inches high by 11-9/16 inches wide by 3-9/16 inches deep.
 - a. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the following brick and mortar materials:
 - 1) Masonry Type 1: Interstate Brick, Ogden, UT, product, "Ash L-4" and "Pewter L-4"
 - 2) Brick mix: Provide 50/50 ratio of each specified brick subject to Architect's approval of mockup panel. Brick quantities may be adjusted.
2. Under the base bid, the Masonry Trade Contractor is required to submit one product for each "Brick Type", matching the quality, grade, texture, and color range of those specified herein. Bricks submitted as "equal" to those specified, will be evaluated by the Architect relative to characteristics, color range, surface texture, density and compressive strength. Bricks considered "not equal" to bricks specified will be rejected. The Construction Manager shall take into consideration submittal review time in scheduling of the work. Delays resulting from failure to submit an acceptable brick product are the joint responsibility of the Masonry Trade Contractor.

C. Building brick: ASTM C 62, Grade SW, solid units in size to match facing brick.

2.3 THIN BRICK UNITS

A. Masonry Type 1A: Thin brick units comply with ASTM C 1088, Grade Exterior, Type TBX, not less than 9/16 inch thick, and as follows:

1. Masonry Type 1A: Interstate Brick, Ogden, UT, product, "Ash L-4" and "Pewter L-4"
2. Brick mix: Provide 50/50 ratio of each specified brick subject to Architect's approval of mockup panel. Brick quantities may be adjusted.
3. Face Size: 3-9/16 inches high by 11-9/16 inches wide.

4. Shapes: Provide special shapes as indicated on Drawings and for applications where forms, size or finish cannot be produced from standard shapes.
 - a. Provide special shapes for applications where flats (stretcher units) cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, shelf angles and lintels. Mitered units shall not be used at standard corners.
 - b. Provide special shapes for applications requiring thin brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - c. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
5. Initial Rate of Absorption: Less than 30g/30 sq. in. per minute when tested per ASTM C 67.
6. Efflorescence: Provide thin brick units that meet ASTM C 67 and is rated "not effloresced".
7. Back Surface Texture: Scored, combed, wire roughened, or ribbed.
8. Acceptable Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include the following or approved equal:
 - a. Taylor
 - b. Summitville Tiles, Inc., Summitville, OH.
 - c. MetroBrick (Ironrock Capital, Canton OH).
 - d. Beldon Brick Company, Canton OH.

2.4 CONCRETE MASONRY UNITS

- A. Acceptable concrete masonry manufacturers: Subject to compliance with the requirements specified herein, Fabricators offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
 1. Westbrook Concrete Block Company, Westbrook, CT
 2. D'Agostino Building Blocks, Schenectady, NY.
 3. Foster-Southeastern, Inc., Holbrook, MA.
 4. Adolf Jandris and Sons, Inc.; Gardner, MA.
 5. Anchor Concrete Products, Inc.; Brick, NJ.
 6. Trendstone, Trenwyth Industries, Inc.; Emigsville, PA.
 7. Medway Block Company, Inc., Medway MA.
 8. Park Avenue Cement Block Co. Cranston RI.
- B. Provide hollow and solid load bearing concrete masonry units conforming to ASTM C90-06b, type I, moisture controlled units. Provide concrete masonry having the following characteristics:
 1. Size, Standard Units: Provide units with nominal 8 inches by 16 inches face size by thickness indicated for 3/8 inch joints unless indicated otherwise. Provide thicknesses indicated, or if not indicated, as necessary to create a properly supported, structurally safe wall built within the height to width

- limitations required by codes and recommended by the National Concrete Masonry Association.
2. Shapes: Provide special shaped units for lintels, corners, jambs, headers, control joints and other conditions. Never expose cores.
 3. Grade: Provide grade N for all work unless otherwise indicated.
 4. Weight: Provide normal weight units, except provide units with weight as standard with manufacturer for all units in fire-rated assemblies.
 5. Concrete Masonry Units for Fire Resistive Construction: Provide concrete block for construction of fire-rated masonry block construction as listed by Underwriters' Laboratories, Inc. of Minimum Equivalent Thickness(es) defined and required by governing code.
 6. Provide half-blocks, lintel blocks, beam "U" blocks, other special blocks, and required special cutting. Provide jamb blocks, end blocks, control joint blocks, and lintel blocks with exposed ends closed.
- C. Concrete Building Brick: ASTM C55 and characteristics indicated below for grade, type, size and weight classification.
1. Grade: N.
 2. Type: moisture controlled units, Type 1.
 3. Size: modular, 2-1/4" x 3-5/8" x 7-5/8".
 4. Weight classification: Same as for concrete block.
- D. Concrete masonry grout blocks: Open end high strength concrete masonry units and slot type strength concrete masonry units for use at reinforced concrete masonry construction where indicated on the Drawings. Conform to all requirements specified above for standard concrete masonry units, and the following additional requirements:
1. Plain-faced units of nominal thickness indicated on the Drawings, nominal 8 inch by 16 inch face dimension with light gray color and uniform medium-fine texture, sound, true to plane and line, and free from chips, cracks, and other defects.

2.5 MORTAR

- A. Mortar for Masonry Type 1A: Prepackaged mortar (ready mix) complying with ASTM C 1142 equal to Laticrete "MVIS Hi-Bond Veneer Mortar".
1. Admixtures are not permitted except where expressly specified herein or as otherwise approved by Architect for specific field conditions.
 2. Color and texture: As selected by Architect from manufacturer's full range of standard and premium colors.
- B. Prepackaged mortar (ready mix) complying with ASTM C 1142, or site-mixed portland cement mortar complying with ASTM C 270 may be used.
1. Admixtures are not permitted except where expressly specified herein or as otherwise approved by Architect for specific field conditions.
 2. Color and texture: As selected by Architect from manufacturer's full range of standard and premium colors.
- C. Mortar materials for site mixed mortar:

1. Portland Cement: Comply with ASTM C150, Type I, free from water soluble salts and alkalies. Provide cement that exhibits no efflorescence when tested in conformance with standard efflorescence test, ASTM C 67, modified to use 2 inch by 7 inch by 2-1/2 inch mortar samples consisting of a mixture of 1 part by weight of cement under test and 2 parts of sand mixed to a flow of 100 percent with water. Provide cement color as necessary to provide mortar colors required by Architect. Two colors are required. Use Type III as necessary for laying masonry in cold weather.
2. Aggregates for brick mortar: Clean sand, washed uniformly well graded, conforming to ASTM C 144, except for joints 1/4 inch and down use aggregate with 100 percent passing a No. 16 sieve.
3. Aggregates for grout: Conforming to ASTM C 404.
4. Aggregate for concrete masonry mortar: Clean, washed uniformly well graded sand conforming to ASTM C 144, with the following gradation, and having a fineness modulus between 2.15 and 2.35:

Seive Size	Percentage Passing
#4.....	100%
#8.....	95 to 100%
#16.....	70 to 100%
#30.....	40 to 75%
#50.....	10 to 35%
#100.....	2 to 15%
#200.....	0 to 5%
5. Mortar pigments: Commercial alkali-resistant, non-fading mortar pigments, oxides of iron where feasible, synthetic type, equal to products of
 - a. Davis Colors, Beltsville MD.
 - b. Solomon Grind-Chem Service, Inc., Springfield, IL.
 - c. Prism Corporation Inc., St. Paul, MN.
6. Lime: Approved brand of plastic hydrated lime, conforming to ASTM C 207, Type "S".
7. Water: Clean and fresh without contaminants.

D. Prepackaged mortar (ready mix)

1. General: complying with ASTM C 1142, factory blended consisting of:
 - a. Portland cement: Comply with ASTM C 150, Type I.
 - b. Hydrated lime: Type S, complying with ASTM C 207.
 - c. Aggregate: Provide clean, sharp, well graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter, and complying with ASTM C144.
 - d. Admixtures: Prepackaged mortar mixes contain manufacturer's own proprietary admixtures, additional field admixtures are strictly prohibited.
 - e. Water: Provide water free from deleterious amounts of acids, alkalis, and organic materials. Water shall be potable.
 - f. Pigments: Chemically inert synthetic iron oxide pigments, lightfast, weather resistant, complying with ASTM C-979.

- 1) Mortar Color: As selected by Architect from manufacturer's full range of standard colors.

E. Mortar types:

1. Mortar for masonry below grade or in contact with earth: ASTM C 270 type M using the property specification.
2. Mortar for load bearing masonry: ASTM C 270 type S using the property specification.
3. Mortar for non-load bearing masonry above grade: ASTM C 270 type N using the property specification.

2.6 GROUT MIXES

- A. Prepackaged grout (ready mix) complying with ASTM C 1107, or site-mixed Portland cement grout complying with ASTM C 476 may be used.
- B. Grout for setting equipment, anchor bolts, elevator guide rails, structural steel elements and miscellaneous metals: Non-metallic high-strength controlled expansion grout of flowable consistency, having a compressive strength of 6,500 pounds per square inch (44.8 MPa) at 28 days; slump 8 to 10 inches.
 1. Five Star Products, Inc., Fairfield CT, product "Five Star Grout".
 2. L&M Construction Chemicals, Omaha NE, Product: "Crystex".
 3. Master Builders, Cleveland, OH, product "Masterflow 713".
 4. Sika Corporation, Lyndhurst, NJ, product "SikaGrout 212".
 5. Sonneborn Building Products, Minneapolis, MN, product "SonogROUT 10K".
 6. Symons Corporation, DesPlaines, IL, product "Symons Multi Purpose Grout".
- C. Grout for engineered masonry (core fill) and behind masonry below grade: Course grout having a compressive strength of 2,000 to 2,250 pounds per square inch (13.8 to 15.5 MPa) at 28 days; slump 8 to 10 inches.
- D. Grout for bond beams and lintels: Fine grout having a compressive strength of 2,500 to 3,000 pounds per square inch (17.2 to 20.6 MPa) at 28 days; slump 8 to 10 inches.

2.7 REINFORCEMENT AND ANCHORAGE MATERIALS

- A. Single wythe longitudinal reinforcement for concrete masonry unit walls and partitions: in overall width 1-5/8 inches less than the overall wall thickness, as manufactured by Heckman, Hohmann, Wire Bond, or equal.
 1. Interior partitions: Truss design, 9 gage ASTM A 641 class 1 galvanized wire.
 2. Exterior partitions: Exterior partitions: Truss design, 9 gage ASTM A 580, Type 304 stainless steel adjustable reinforcement with moisture drip equal to Hohmann and Barnard, product "170-2X Truss Eye-Wire Adjustable Reinforcement.
 3. Provide preformed reinforcing sections at intersections of masonry walls and partitions, and whenever walls and partitions change direction.
- B. Multi wythe longitudinal reinforcement for concrete masonry unit walls and partitions: in overall width 1-5/8 inches less than the overall wall thickness, with

moisture drip as manufactured by Heckman, Hohmann & Barnard, Wire Bond, or equal.

1. Interior partitions: Truss design, 9 gage ASTM A 641 class 1 galvanized wire without a moisture drip
 2. Exterior partitions: Truss design, 9 gage ASTM A 580, Type 304 stainless steel adjustable reinforcement with moisture drip equal to Hohmann and Barnard, product "170-2X Truss Eye-Wire Adjustable Reinforcement with 2X Hook".
- C. Reinforcing steel, additional to rods which are embedded in concrete: Solid steel reinforcing bars, conforming to ASTM A 615, Grade 60 of sizes indicated on the Drawings.
- D. Veneer anchorage for metal stud curtain wall system shall be twin screw anchor plate design with "U" shaped adjustable pintle. Back plate shall be fabricated from 12 gauge stainless steel sheet metal, in length required to suit insulation thickness with double leg pintle formed from 3/16 inch diameter cold drawn stainless steel wire tie. Size ties to penetrate a minimum of two-thirds of the depth of veneer when measured from the back face. Anchor spacing shall be as specified in herein below.
1. Acceptable concrete masonry manufacturers: Subject to compliance with the requirements specified herein, Fabricators offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
 - a. Heckmann model number 213 backplate with 282 pintle wire tie.
 - b. Hohmann & Barnard model number HB-213-2X back plate with pintle wire tie.
 - c. Wire Bond Inc., model number RJ-711 backplate with 2402 pintle wire tie
 2. Fastener screws:
 - a. Stainless steel, equal to Dur-o-Wal (300 series) model number D/A 995.
 3. Insulation retention washers:
 - a. Hohmann & Barnard model number HB-213, or approved equal.
- E. Metal grid system for Masonry Type 1A: 18 gauge architectural grade steel, hot-dipped galvanized to G-90, with a painted, finish with tabs punched into and protrude outwards from the plane that support and space the thin veneer. Panels shall be (1200mm x 600mm) 48 inches by 24 inches, (1200mm x 1200mm) 48 inches by 48 inches and custom sizes as required to suit field applications.
1. Acceptable concrete masonry manufacturers: Subject to compliance with the requirements specified herein, Fabricators offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
 - a. Brick-It, Hauppauge, NY product, "Designer Metal Grid System (DMG)".
 - b. AsTech Associates, Inc., product, "BrickFast".
 - c. American Brick Company (Ambrico), Warren, MI product, "EZ-Wall".

- F. Masonry welding couplers: Weldable rebar coupler to join reinforcing bar to structural steel with self-aligning taper thread fabricated from AISI 1018, 1030 or 1035 material.
 - 1. Acceptable concrete masonry manufacturers: Subject to compliance with the requirements specified herein, Fabricators offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
 - a. Erico International Corporation, Solon, OH, product, "Lenton Half Coupler C2 and CJ3 Mechanical Rebar Splice".

2.8 CAVITY WALL INSULATION

- A. Cavity wall insulation behind masonry (or as otherwise noted): Semi-rigid mineral wool insulation for exterior wall cavities: mineral wool fiber insulation board, conforming to ASTM C612, Type IVB having a nominal density of 4.4 pounds per cubic foot.
 - 1. Non-Combustible as tested per ASTM E-136.
 - 2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
 - 3. Thermal Resistance: ASTM C518 (C177), R-value of 15 minimum at 3-1/2 inches thick.
 - 4. Thickness: As indicated on Drawings.
 - 5. Size: 16 inches x 48 inches (406 mm x 1219 mm).
 - 6. Acceptable products include the following or approved equal:
 - a. Roxul, Inc., Milton, Ontario, product "CavityRock".
 - b. Owens Corning, Wabash IN, product "Thermafiber, RainBarrier 45."
 - c. Johns Manville, Inc., Denver CO. product: "MinWool Curtainwall CW4".
- B. Contact adhesive: Liquid or spray applied for adhering semi-rigid mineral wool insulation. Provide adhesive compatible with both surfaces to be joined. Provide letters of compatibility from each manufacturer.
- C. Insulation plate and fastener: 3-inch diameter metal insulation plate, 0.017 thick galvalume coated steel, .265 ID. hole with corrosion resistant fasteners used for fastening rigid insulation to concrete or steel at locations referenced on the detail drawings only.

2.9 FLASHING MATERIALS

- A. Stainless steel through wall flashing: Two piece counterflashing, flashing drip edge and membrane through wall flashing backer, Type 302/304 stainless steel with a 45 degree exposed hemmed edge designed to extend beyond the masonry face a minimum of 3/16 inch to maximum 3/8 inch.
- B. Through wall flashing membrane: Flexible self-sealing, self-healing, fully adhering composite flexible flashing, .8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to .2 mm (8 mils) of cross-laminated, high-density polyethylene film to provide a min. 1 mm (40 mil) thick membrane. Membrane shall be interleaved with silicone-coated release paper until installed. Provide with

manufacturer recommended surface conditioners, termination mastics and pre-formed corners.

1. Product:
 - a. Carlisle Waterproofing, product: CCW-705-TWF.
 - b. W.R. Grace, product: Perm-A-Barrier flashing
 - c. Pecora Corporation, product Duramen 700.
2. Minimum performance characteristics.
3. Surface primer: Latex based, water dispersed liquid for substrate as recommended by wall flashing manufacturer.
4. Termination mastic: Rubberized asphalt-based mastic with 200 grams/liter max VOC content for use in sealing flashing membrane terminations and punctures, as recommended by wall flashing manufacturer.

C. Through-wall flashing termination membrane: Flexible self-sealing, self-healing, fully adhering composite flexible flashing, (30 mils min.) of self-adhering butyl adhesive integrally bonded to .2 mm (8 mils) of cross-laminated foil facer to provide a min. 1 mm (40 mil) thick membrane. Membrane shall be interleaved with silicone-coated release paper until installed. Provide with manufacturer recommended surface conditioners, termination mastics and pre-formed corners.

1. Product:
 - a. Berry Plastics Corporation, product – Polyken 626-35 Foilastic.
 - b. Carlisle Waterproofing product – Aluma-Grip 701.
 - c. Tremco, product – ExoAir Foil Flashing.
2. Provide sealant compatible with both surfaces to be joined. Provide letters of compatibility from each manufacturer.

D. Through wall termination bar: 1/8 inch by 1 inch, 1/4 inch holes spaced 8 inches on center, Type 304 stainless steel. Used at top of flashing to secure it to back up at brick shelf and at concrete masonry unit construction.

2.10 ANTI-GRAFFITI COATING

A. Clear-drying, water-based silicone emulsion for weatherproofing porous masonry materials and protecting them from graffiti attacks without altering the natural appearance. Anti-graffiti coating shall be appropriate for interior and exterior use. Anti-graffiti coating shall also protect exterior walls exposed to normal weathering.

1. Characteristics:
 - a. Form: White liquid, slight odor.
 - b. Specific gravity: 1.00.
 - c. pH: Not applicable.
 - d. Weight/gallon: 8.32 pounds.
 - e. Active content: 6 percent.
 - f. Total solids: 6 percent when tested in accordance with ASTM D 2369.
 - g. VOC content: Less than 20 grams per liter, low solids coating. complies with all known federal, state and district aim voc standards.

- h. Flash point: Greater than 212 degrees f (>100 degrees c) when tested in accordance with ASTM D 3278.
- i. Freeze point: 32 degrees f (0 degrees c).
- 2. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on ProSoCo, Kansas City, KS, Product: "Sure Klean® Weather Seal Blok-Guard® & Graffiti Control II".
- 3. Acceptable Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include the following or approved equal:
 - a. ProSoCo, Kansas City, KS.
 - b. Rainguard Products Company, Newport Beach, CA.
 - c. The Euclid Chemical Company, Cleveland, OH.

2.11 ACCESSORIES

- A. Compressible filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.
- B. Compressible filler for joints at tops of non-load bearing masonry partitions, and for expansion joints in masonry walls: Closed cell Neoprene or PVC foam board, soft grade, 25 percent thicker than joint width, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.
- C. Premolded control joints for concrete masonry construction: Solid rubber of profile as indicated (to maintain lateral stability of wall), 60-80 shore A hardness.
- D. Building paper (to maintain joints open for subsequent application of sealant and backer rod): N°. 15 asphalt saturated felt.
- E. Weeps for veneer: flexible, ultraviolet resistant honeycomb polypropylene weep, equal to:
 - 1. Hohmann & Barnard, product, "Model GV Quadro-Vent",
 - 2. Heckman, product, "#85 Cell Vent".
 - 3. Wire Bond, product, "Model 3601 Cell Vent".
- F. Mortar netting: High Density Polyethylene (HDPE) course geotextile fabric having a 90 percent open weave mesh, with stepped topped edging, shaped in a manner to catch and hold mortar droppings and preventing blockage of weep hole vents, nominal 1 inch thick by 5 feet long by 10 inches high.
 - 1. Hohmann & Barnard, Inc. product "Mortar Net".
 - 2. Mortar Net USA, Ltd., product "Mortar Net".
 - 3. Wire Bond, Inc., product "Mortar Net Green".
- G. Sealant for metal through-wall flashing: Joint Sealer Type PE (Polyether), Low modulus type, Single-component non-sagging gun-grade, low-odor, neutral curing polyether, sealant, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type S, Class 25, Grade NS, use NT, T, M, G, A and O with a minimum movement capability of ±25 percent, equal to the following:

1. STS Coatings, product "GreatSeal PE-150" Sealant.
 2. Chem Link, product "MetaLink".
 3. Sonneborn, product, "Sonolastic 150".
 4. York Manufacturing, product: "PE-150 Liquid Tape".
- H. Cleaning solution: Non-acidic, not harmful to masonry work or adjacent materials.
- I. Sealant for installation at back of masonry anchors prior to fastening studs:
1. Compatible with and recommended by the air vapor barrier membrane manufacturer specified under Section 07 27 13 – MEMBRANE AIR BARRIER.
- J. Through wall flashing at expansion joints: 40 mils minimum EPDM membrane throughwall flashing at expansion joints in zinc-coated copper through-wall flashing equal to the following:
1. Wirebond, product, "EPDM Thru-wall Flashing
 2. Carlisle, product, "Pre-Kleened EPDM Flexible Flashing"
 3. Hohmann & Barnard, product, " EPRA-Max EPDM Thru-Wall Flashing"

2.12 MIXING MORTARS AND GROUT

- A. General: Mix mortar and grout in accordance with the requirements of ASTM C270, and ASTM C476 as applicable.
1. Control batching procedure to ensure proper proportions by measuring materials by volume. Amount of mixing water and mortar consistency shall be controlled by mason.
 2. Control batch sizes to allow for use within manufacturer's recommended pot life.
 3. Retempering will be permitted only within the first two hours of initial mix or shorter times as directed by manufacturers.
 4. Discard all mortar and grout which exceeds the time limits allowed by the manufacturer. Discard mortar that has partially set.
- B. Maintain sand uniformly damp immediately before mixing process.
- C. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar or grout.
- E. Pouring grout shall be fluid consistency (as fluid as possible for pouring without separation of constituent parts).

2.13 SOURCE QUALITY CONTROL

- A. Preconstruction testing: Except for testing by the Contractor, required as part of this Section, or Section 01 45 29 – TESTING LABORATORY SERVICES, the Owner will employ and pay a qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source quality control:

1. Clay unit masonry tests: For each different clay masonry unit indicated, units will be tested per ASTM C 67. Test each type and grade of brick for compression, water absorption and efflorescence per ASTM C67. If coefficient of variation of compression samples tested exceeds 12 percent, obtain compressive strengths by multiplying average compressive strengths by $(1 - 1.5) \times (0.01 \times \text{coefficient of variation}) - 0.12$
2. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.
3. Mortar efflorescence: Test each mortar type which will be exposed to weather for efflorescence in accordance with the "Wick test" procedure in BIA Research Report Number 15, The Causes and Control of Efflorescence in Brickwork", Section 4.4. Mortar mixes which show efflorescence shall not be used in the Work.
4. Mortar composition and properties will be field evaluated per ASTM C 780 for compressive strength, consistency, mortar aggregate ratio, water content, air content, and splitting tensile strength.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive the work of this Section.
- B. Verify built-in and other items provided by separate Sections of the work are properly sized and located.
- C. Verify foundation walls supporting masonry is constructed within tolerances required by code
- D. Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Foundations:
 1. Do not commence installation until foundations are clean, rough, and level.
 2. Prepare foundation tops, if necessary remove all laitance and foreign material.
 3. Verify that the foundation elevation is such that the bed joint thickness shall not vary from specified thickness, and that the foundation edge is true to line with masonry not projecting over more than 1/4".
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- D. Protect surfaces of windows, door frames, louvers and vents as well as similar finish products with painted and integral finishes from mortar droppings and stains.

3.3 INSTALLATION - GENERAL

- A. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase recess and jamb of openings and between adjacent chases and recesses.
- B. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.
- C. Establish lines, levels and coursing indicated. Protect from displacement.
- D. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- E. Isolate masonry partitions from vertical structural framing and where indicated on the Drawings. Maintain joints free from mortar, ready to receive sealant and joint bead back-up.
- F. Provide compressible filler at tops of interior masonry partitions abutting structural above.

3.4 COURSING, BONDS AND JOINTS

- A. Coursing, joints and bond pattern: 1/3 running bond except as otherwise indicated on the Drawings.
- B. Joints:
 - 1. Exposed to view masonry: except as specified below, fill all joints with mortar, strike off flush, and when mortar is thumb print hard tool joints with a non-staining tool. Joints shall be free of drying crack.
 - a. Horizontal joints
 - 1) Exterior joints at brick: tool joints concave, weathered to drain with top of joint recessed approximately 1/16 inch behind face of brick.
 - 2) Interior joints (all): Tool joints concave where exposed to view otherwise strike off flush.
 - b. Vertical joints (all): Tool joints concave.
 - 2. Concealed from view masonry, including masonry which will be concealed by flashings and similar materials: Fill joints with mortar and strike joints flush. Concave tool exterior joints below grade.
 - 3. All vertical joints in precast concrete elements to receive backer rod and sealant refer to Section 07 92 00 – JOINT SEALANTS.

3.5 CONTROL JOINTS

- A. Locate control joints where shown on Drawings, at corners adjacent to openings in masonry, changes in wall height, inside corners and intersections with structural walls as approved by Architect.
 - 1. Do not continue horizontal joint reinforcement through control joints.

- B. Form vertical control joints with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
 - 1. Size control joints in accordance with the requirements of Section 07 92 00 - JOINT SEALANTS.
 - C. Construct control joints interrupted by lintels per Brick Institute's Detail 31B, Revised. Joint to wrap around end of lintel.
- 3.6 LAYING MASONRY - GENERAL
- A. Build the masonry walls and partitions in the various combinations and thickness as indicated on the Drawings.
 - B. Erect all masonry work in compliance with the line and level tolerances specified herein. Hold uniform joint sizes. Correct, or replace, as directed by the Architect, non-conforming masonry work at no additional cost to the Contract.
 - C. Lay out coursing before setting to minimize cutting closures or jumping bond, Avoid the use of less-than-half-size units.
 - D. Laying masonry units:
 - 1. Lay solid masonry units in full bed of mortar, with full head joints; uniformly joint with other work.
 - 2. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
 - 3. Interlock intersections and external corners.
 - 4. Cut all exposed masonry with a motor-driven carborundum blade saw to ensure straight and clean, unchipped edges.
 - a. Lay no unit having chipped edges or face defects where such unit would be exposed to view. Remove any such unit, if installed, and replace with an undamaged unit, and bear all costs therefore.
 - 5. Do not spread any more mortar than can be covered before surface of mortar has begun to dry.
 - 6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove entirely, clean off mortar, and reset with fresh mortar.
 - 7. Except for cleaning down and repointing, finish all masonry as the walls and partitions are carried up.
 - E. Build-in reinforcement and anchorage items as the work progresses, grouting for secure anchorage.
 - 1. Where steel reinforcing rods have been cast into concrete slabs, and left with upturned ends, carefully place masonry units down over the upturned ends of the rods, and fill cells of masonry units with specified grout.
 - 2. Embed prefabricated horizontal joint reinforcing as the work progresses, with a minimum cover of 5/8" (16 mm) on exterior face of walls and 1/2" (13 mm) at other locations. Lap units not less than 6" (152 mm) at ends. Use prefabricated L and T units to provide continuity at corners and intersections.

Cut and bend units as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

- F. Except as indicated otherwise, isolate masonry from overhead structure:
 - 1. Isolate masonry partitions from vertical structural framing members with a control joint.
 - 2. Isolate top joint of masonry partitions from horizontal structural framing members and slabs, decks or blocking with compressible joint filler.
- G. Provide control joints at 30 feet on center maximum spacing and elsewhere as indicated on the Drawings, keep clean of mortar droppings.
- H. Provide complete protection against breakage and weather damage to all masonry work, including substantial wood boxing around door jambs, over the tops of walls and wherever necessary to protect work at all stages of completion. Protect masonry when not roofed over, at all times when masons are not working on the walls. Apply tarpaulins or waterproof paper, properly weighted, or nailed, to assure their remaining in place to protect masonry from all possible hazards.
- I. Point and fill all holes and cracks in new mortar joints with additional fresh mortar; do not merely spread adjacent mortar over defect or use dead mortar droppings. Do all pointing while mortar is still soft and plastic. If hardened, chisel defect out and refill solidly with fresh additional mortar, and tool or rake joints as specified herein.
- J. Protect all masonry from rain prior to, and during the installation thereof. If the temperature is in excess of 80 degrees Fahrenheit at time of installation, lightly moisten contact surfaces of masonry units by brushing with water.
- K. Cold/Hot Weather Procedures: No masonry work shall be laid in temperatures below 40 degrees Fahrenheit without the submittal to and review by the Architect of cold weather procedures.
 - 1. In ambient temperatures below 40 degrees Fahrenheit make provisions to adequately protect the masonry materials and the finished work from frost, including heating of masonry materials.
 - a. Heat enclosed work areas as necessary to adequately protect the work of this Filed Subcontract. Temporary heat and protection measures required including tenting, tarpaulins, heaters, fuel and all associated costs shall be the sole responsibility of this Filed subcontractor.
 - 2. No frozen work shall be built upon nor shall anti-freeze admixtures be permitted in the mortar mix.
 - 3. Any completed work found to be affected by frost shall be taken down and rebuilt at no additional expense to the Owner.

3.7 FLASHING

- A. Provide and build-in through-wall flashings at lintels, heads and sills of openings and infill openings. Additionally provide flashing where indicated on the Drawings, as specified herein and all conditions which may be considered similar to those indicated on the Drawings.

1. Install through wall flashing with hemmed 45 degree edge extending beyond face of masonry not less than 3/16 inch or maximum of 3/8 inch. Ensure through-wall flashing is in proper position in wythe without forming pockets. Solder joints. Install EPDM through-wall flashing and cover plate over top of metal flashing at expansion joints, starting 1/2 to 3/4 inch behind face of masonry. Pitch flashing towards exterior.
 2. Extend metal flashing to back up wall, turn up a minimum of 8 inches and terminate as follows:
 - a. Concrete - terminate on to concrete set in sealant, secure top edge of flashing with termination bar, seal top edge of termination bar and fastener heads.
 - b. Masonry - terminate into horizontal joint of masonry, extending to 1/2" of interior face of wall, turning back 1" on itself.
 - c. Metal stud and gypsum sheathing - terminate over sheathing and set into Type PE sealant, secure top edge of flashing to studs with type S-12 low profile head screws. Seal and install metal flashing termination membrane onto metal flashing.
 3. Form end dams at all horizontal terminations; turn flashing, fold and seal (not cut) at corners, bends and interruptions. Seal watertight using flashing manufacturer's recommended adhesive and sealer.
 4. Carry head flashing 6 inches beyond both ends of lintels and install end dams. At steel lintels, apply a heavy bed coat of compatible adhesive mastic and embed thru-wall flashing in the mastic before laying brick. Extend flashings out of walls and trim when mortar has cured.
 5. Seal all punctures with an elastic cement mastic recommended by flashing manufacturer.
- B. Build-in counter flashing as indicated in the Drawings and as specified herein.
1. Clean surface of masonry smooth and free from projections that might puncture or otherwise damage flashing membrane.
 2. Carefully fit flashing around projections, neatly fold and bed in mastic or mortar so as to direct moisture to the outside. Form flashing to required profiles without wrinkles or buckles and install in such a manner as to direct moisture to the outside.
- 3.8 CAVITY WALL CONSTRUCTION
- A. Install all insulation in advance of the masonry wall construction allowing sufficient time for field review and testing.
 - B. Install continuous row of "mortar netting" at base of wall and over all wall openings directly onto flashing. Install multiple thickness of "mortar netting" as required to match cavity widths and if excessive droppings are expected.
 1. Install mortar netting against back of outside wythe with dovetail section facing up. Cut netting as required to prevent contact with wall ties, conduit, plumbing and or other materials that bridge or intrude into cavity.
 - C. Remove excess mortar as work progresses. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.

- D. Anchorage for brick veneer: Install specified wall ties as shown on Drawings, if not shown, install one wall-tie/anchor for every 16 inches on center both horizontally and vertically of veneer wall area
 - 1. Place additional wall ties around perimeter of openings and within 12 inches of ends of walls.
 - 2. Place additional wall ties on each side of expansion joints, install within 4 inches of joint.
 - 3. Place wall ties starting with the third course of brick masonry or 8 inches of concrete foundation walls.
 - 4. Attach metal ties to metal anchors previously screw attached through sheathing to each metal stud.

- E. Install semi-rigid insulation in core of cavity walls, applying horizontally to exterior face of backup. Cut insulation to fit between wall ties and insure that all insulation boards are butted and that the entire surface of the backup masonry is completely covered by insulation.
 - 1. Apply compatible adhesive, stagger vertical joints. Apply foam sealant and butt edges and ends tight to adjacent board and to protrusions. Place rigid insulation retention washers. Tape seal board joints.

3.9 WEEP HOLES

- A. Provide weep holes in head joints in first course of veneer immediately above all through-wall flashing, shelf angles, lintels and bottoms of walls.
- B. Install specified pre-fabricated weeps in head joint.
 - 1. Space weep holes: 24 inches on center maximum.
- C. Keep weep holes and area above flashing free of mortar droppings.

3.10 ENGINEERED MASONRY

- A. Lay masonry units with core cells vertically aligned and clear of mortar and unobstructed.
- B. Refer to the Drawings for locations where vertical steel reinforcing rods will be required in masonry walls. Reinforce masonry unit cores with reinforcement bars and grout.
- C. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Division 3 - Concrete.
- D. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- E. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using high or low grouting techniques.
- F. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.

- G. Low lift grouting: Place first lift of grout to a height of three concrete masonry unit courses, and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.

3.11 BUILDING-IN WORK

- A. As work progresses install built-in metal door and glazed frames, fabricated metal frames, wood nailing strips, anchor bolts, plates and other items to be built-in the work.
 - 1. Protect surfaces of prefinished built-in items.
- B. Install built-in items plumb and level; take care not to distort alignment of such items.
- C. Bed anchors of metal frames in adjacent mortar joints. Fill frame voids solid with grout except where joints are indicated to receive caulking and sealant. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
 - 1. Rake joints to receive sealant to a uniform depth of 3/4 inch for installation of caulking and sealant.
- D. Do not build-in organic materials subject to deterioration.

3.12 BUILDING-IN LINTELS

- A. Install loose lintels over all openings, whether or not scheduled.

3.13 REINFORCEMENT AND ANCHORAGE

- A. Reinforce horizontal joints with continuous masonry joint reinforcement, spaced 16 inches vertically commencing one course above supporting concrete slab.
- B. Place masonry joint reinforcement in first and second horizontal joint above and below openings. Extend 16 inches each side of opening.
- C. Place joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Install preformed units (or optional field-formed units) at corners, reveals, and offsets in exterior masonry, at intersections of all masonry walls and partitions, and wherever walls and partitions change directions.
- F. Do not bridge control and expansion joints in the wall system.
- G. Anchor ends of walls to structure with anchors spaced 24 inches, except as otherwise shown.
- H. Embed anchors in concrete. Attach to structural steel members. Embed anchorages in every second block. Embed anchorages in sixth brick joint.
- I. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

3.14 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the provisions of Division 1 – GENERAL REQUIREMENTS (Section 01 45 00 - QUALITY CONTROL, or Section 01 45 29 – TESTING LABORATORY SERVICES, as applicable).
- B. Testing frequency: Tests and evaluations listed in this article shall be performed during construction for each 5000 square feet of wall area of each wall type or portion thereof.
- C. Prism Test Method: For each type of wall construction indicated on Drawings, masonry prisms will be tested per ASTM E 447, Method B: and as follows:
 - 1. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.
- D. Evaluation of Quality Control tests: In absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from source quality control tests comply with minimum requirements indicated.

3.15 PROTECTION OF WORK

- A. Loading: Do not apply loading for at least 12 hours after building masonry walls and partitions. Do not apply concentrated loads for at least 3 days after building masonry columns, walls or partitions.
- B. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to un-constructed wythe and hold cover in place.
- C. Stain prevention: Provide protection and prevent grout, mortar, and soil from staining the face of exposed masonry and building finishes. Protect base of walls from rain-splashed mud and mortar splatter.
 - 1. Remove immediately all grout, mortar, and soil that come in contact with such masonry.
- D. Protect finishes of built-in work including but not limited to hollow metal doors and frames, glazing frames, fabricated metal frames, window, storefront and curtain wall frames and other related items.

3.16 TOLERANCES

- A. Maximum variation from true surface level for exposed to view walls and partitions:
 - 1. Unit-to-unit tolerance: 1/16 inch.
 - 2. Surface, overall tolerance: 1/4 inch in 10 feet in any direction and 1/2 inch in 20 feet or more.

- a. Where both faces of single wythe wall or partition will be exposed to view, request and obtain decision from the Architect as to which face will be required to conform to the specified surface level tolerance.
- B. Maximum variation from plumb: For lines and surfaces of walls do not exceed 1/4 inch in 10 feet, 3/8 inch in any story up to 20 feet maximum. At expansion joints and other conspicuous lines, do not exceed 1/4 inch in 20 feet.
- C. Maximum variation from level: For lines of sills, tops of walls and other conspicuous lines, do not exceed 1/8 inch in 3 feet, or 1/4 inch in 10 feet and 1/2 inch in 30 feet.
- D. Maximum variation of linear building line: For position shown in plan relating to columns, walls and partitions, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet.
- E. Maximum variation in specified height: 1/2 inch per story.
- F. Maximum variation of joint thickness: 1/8 inch in 3 feet.
- G. Maximum horizontally projected unsupported masonry unit: 1-1/8 inches

3.17 CLEANING

- A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
- B. Progress Cleaning:
 - 1. General: Maintain site free of waste materials, debris, and rubbish resulting from the work of this Section.
 - a. Remove from work areas surplus and waste materials resulting from the work of this Section. Remove on a continual on-going basis throughout the term of construction.
 - 2. During the progress of the work, keep the exposed surfaces of masonry clean at all times, and protected against damage. As each segment of the masonry is erected, dry-brush the surfaces free from mortar spots and droppings.
- C. Prior to performing the final cleaning work, examine all face joints in exposed masonry to locate cracks, holes or other defects in the mortar; and point up all such defects and fill with mortar as specified herein. Where necessary, in the opinion of the Architect, cut out defective joints in masonry and replace with new materials, exercising extreme care to match original work.
- D. At a time approved by the Architect, perform final cleaning operations on all masonry as specified herein and as recommended by applicable BIA Technical Notes.
 - 1. Perform the final cleaning work only when the ambient temperature is above 40 degrees Fahrenheit, and rising.
 - 2. Do not use wire brushes or other abrasive tools in the cleaning operations.
 - 3. Perform final cleaning operations from the top down. If masonry cleaning work is performed after windows, doors, frames, and other work has been installed,

provide complete protection for said items; be fully responsible for any damage due to the cleaning operations.

4. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
 5. Perform final cleaning of masonry units by scrubbing with stiff bristle fiber brushes and clear water, changing the water frequently.
- E. Provide suitable protective coverings for all other surfaces and materials during the final cleaning procedures, and bear full responsibility for correcting any damage caused by these operations, to the satisfaction of the Architect.

End of Section

Section 04 73 13

CALCIUM SILICATE MANUFACTURED STONE MASONRY
(TRADE CONTRACT REQUIRED AS PART OF SECTION 04 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract: As provided under Section 04 00 01 – MASONRY Trade Contract REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 04 00 01.

1.2 SUMMARY

- A. Furnish cured, reinforced, plant cast simulated masonry units and stone tile, all referred to on Drawings as “Calcium Silicate Masonry Units”, “Masonry Type 2” Masonry Type 2A”, or “CSMU” for installation under Section 04 20 00 – UNIT MASONRY.
 - 1. Provide both manufacturer’s standard shapes, custom fabricated special shapes, and thin tile as shown on Drawings.
 - 2. Make provisions in forms for proper location and installation of pipe sleeves, duct openings, keys, chases, electrical boxes, bolts, anchors, inserts, and similar items, as required by other trades. Notify appropriate trades when items noted are ready for installation.
 - 3. Provide anchorage items to secure simulated stone units in place.
- B. Install Anchors, bolts and plates, flashing reglets required.

1.3 RELATED REQUIREMENTS

- A. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner’s *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- B. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- C. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- D. Section 01 45 00 - QUALITY CONTROL: Perform testing of masonry, mortar and grout specified herein.
- E. Section 01 45 29 - TESTING LABORATORY SERVICES: Perform testing of masonry, mortar and grout specified herein.
- F. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

- G. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- H. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- I. Section 04 00 01 - MASONRY TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's complete product data specifications, performance data, and physical properties for simulated stone and mortar components, and related items including, but not limited to, the following:
 - a. Compressible fillers.
 - b. Simulated stone fabricator's recommended simulated stone cleaning agent and application procedure.
 - 2. Material test reports from a qualified independent laboratory employed and paid by Contractor indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
 - a. Field prepared mortar complying with property requirements of ASTM C 270.
 - 3. Shop drawings: Provide large scale detail drawings for simulated stone; indicate arrangement of joints, bonding and other necessary details; dimension all drawings and represent actual field conditions.
 - a. Provide setting drawings showing all types of simulated stone units, their configuration and size, showing details, arrangement of joints, bonding, details of anchors, inserts, joints, connections to concrete masonry backing, reinforcing and method of installation and anchoring.
 - b. Shop drawings for simulated stone shall show setting mark for each stone and its intended location. The stone when delivered shall bear the same corresponding setting marks on a hidden-from-view surface.
 - c. Show control and expansion jointing, it will be the Contractor's responsibility to establish the jointing in accordance with industry standards and practices. Indicate location of all control and expansion joints in shop drawings.
 - d. Do not proceed with fabrication of material or performance of work until corresponding item on shop drawing has been approved by the Architect.
 - 4. Samples:
 - a. Samples of each embedded masonry accessory item required.
 - b. Simulated stone units and mortar components demonstrating shape, finish, texture and reveals. The Architect reserves the right to reject samples, and request resubmissions, until a sample having the desired shade, finish, and texture is acceptable.
 - 5. Contractor's cold weather and hot weather masonry procedures: Show evidence of compliance with requirements of ACI 530.1/ASCE 6.

B. LEED Submittal Requirements:

1. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
2. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
3. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
4. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

C. Submit maintenance data and surface cleaning instructions under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1.5 QUALITY ASSURANCE

- A. Single-source responsibility for simulated stone: Obtain simulated stone products of uniform texture and color from one fabricator, who is a producer member of the Simulated stone Institute.
- B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- C. Any piece of simulated stone showing flaws or imperfections upon receipt at the storage yard or building site shall be referred to the Architect for his decision as to whether it shall be rejected or repaired for use.

1.6 QUALIFICATIONS

- A. Simulated stone fabricator: Company specializing in performing the work of this Section with minimum of 5 years documented experience.
- B. Installer: Company specializing in performing the masonry work of this Section with minimum of 5 years documented experience. Work shall be done by skilled workmen, fully instructed as to the requirements Specified herein and adequately supervised during the work.

1.7 MOCK-UPS

- A. Provide simulated stone trim elements for mockups provided under Section 04 20 00 - Unit Masonry.

1.8 DELIVERY, STORAGE AND HANDLING

- A. General: Do not deliver cement, lime, and similar perishable materials to the site until suitable storage is available. Store, cement, lime and similar products above earth or floor slabs. Protect from wetting by rain or snow, and keep covered when

not in use. Store metal accessories and the like under cover and from direct contact with ground, and in manner to prevent rust.

- B. Aggregates: Deliver, store and handle aggregate materials so as to prevent contamination with earth or other foreign materials.
- C. Simulated stone: Handle all simulated stone carefully in transit and on the site, so as to keep units whole, with edges sharp, and faces clean and undamaged. Deliver and handle all simulated stone units individually to designated position, consistent with their shape and design.
 - 1. Mark units with date of production in location not visible to view when in final position in structure.
- D. Blocking and lateral support during transport and storage: Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.
- E. Site storage: Store stone under protection, clear of the ground by at least 4 inches, on non-staining planking. Place polyethylene or other suitable plastic film between any wood and simulated stone finished surfaces when stored for prolonged periods. Cover units with polyethylene or other non-staining waterproof material, and during freezing weather, plug Lewis holes to prevent accumulation of water.
- F. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or which show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.9 PROJECT REQUIREMENTS

- A. Cold weather requirements as specified by the International Masonry Industry All-Weather Council (IMIAC): Recommended Practices for Cold Weather Masonry Construction, shall be enforced when ambient temperatures below 50 degrees Fahrenheit.
- B. Do not build upon frozen work. Do not lay simulated stone units having a film of water or frost on their surfaces.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
 - 1. Coordinate the placement of anchorage devices and embedded inserts.
- B. Examine all Drawings as to requirements for the accommodation of work of other trades. Provide all required recesses, chases, slots, and cutouts. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take every precaution to minimize future cutting and patching. Closely coordinate the location and placement of such items.

PART 2 - PRODUCTS

2.1 SIMULATED STONE

- A. Masonry Type 2: Calcium Silicate Masonry Unit, precast calcium silicate masonry units shall be indicated heights by 23-5/8 inches long by 3-5/8 inches deep, high-density, severe weathering, calcium silicate masonry units, pressure formed and autoclaved, "Renaissance Masonry Units" as manufactured by Arriscraft USA Corporation, or equal as approved by Architect.
1. Performance Criteria:
 - a. Compressive Dry Strength: 7757 psi (tested per ASTM 170).
 - b. Modulus of Rupture: 658 PSI (tested per ASTM C99).
 - c. Absorption Rate: 9.4 percent (tested per ASTM C97).
 - d. Density: 131 pounds per cubic foot (tested per ASTM C97).
 2. Units shall be a high density, severe weathering, calcium silicate masonry unit, pressure formed and autoclaved 4, 8, and 12 inches high as indicated on Drawings.
 3. Finishes are smooth face.
 4. Corner units shall have specified finished surfaces on both exposed faces of unit.
- B. Masonry Type 2A: Thin Calcium Silicate Masonry Unit precast calcium silicate masonry units shall be indicated heights by 23-5/8 inches long by 1-3/8 inch deep, high-density, severe weathering, calcium silicate masonry units, pressure formed and autoclaved, "ArrisClip" as manufactured by Arriscraft USA Corporation, or equal as approved by Architect.
1. Performance Criteria:
 - a. Compressive Dry Strength: 6,815 psi (tested per ASTM 170).
 - b. Modulus of Rupture: 800 PSI (tested per ASTM C99).
 - c. Absorption Rate: 10.3 percent (tested per ASTM C97).
 - d. Density: 120 pounds per cubic foot (tested per ASTM C97).
 2. Units shall be nominal 4, 8, and 12 inches high as indicated.
 3. Finishes shall be "smooth" textures, as indicated.
 4. Special shapes: Provide special shapes shown on Drawings.

2.2 MORTAR AND MIXES

- A. Setting and pointing mortar materials: As specified under Section 04 20 00 - Unit Masonry.

2.3 ACCESSORIES

- A. Anchors, Dowels, Ties, Cramps: As specified under Section 04 20 00 – UNIT MASONRY.
- B. Premolded control joint strips for concrete masonry unit construction: Solid rubber of profile as indicated or as required to maintain lateral stability of wall, 60-80 shore A hardness.

- C. Setting cushions: Clear plastic, 1 by 2 inches by thickness of joint.
- D. Clip system for Masonry Type 2A: As recommended by the manufacturer for vertical and horizontal installations equal to Gridworx, Dallas, TX, product "Gridworx".

2.4 SOURCE QUALITY CONTROL

- A. Preconstruction Testing: The Contractor will employ and pay a qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source and field quality control:
 - 1. Simulated stone pieces shall be selected at random from units Testing units shall be selected from every 500 cubic feet delivered to the site.

2.5 FABRICATION TOLERANCES

- A. Maximum Out of Square: Plus or minus 1/16 inch.
- B. Unit dimension variation from dimensions indicated on approved shop drawings: Plus or minus 1/16 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation of CSMU units, is included under Section 04 20 00 - UNIT MASONRY.

End of Section

Section 05 00 01

MISCELLANEOUS AND ORNAMENTAL IRON TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.
 - 1. Specification requirements for the Trade Contract "Miscellaneous and Ornamental Iron" include all the following listed Specification Sections, in their entirety:
 - a. Section 05 50 00 – METAL FABRICATIONS
 - b. Section 05 71 13 – FABRICATED METAL SPIRAL STAIRS
 - c. Section 10 81 13 – BIRD CONTROL DEVICES.
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 05 00 01 – MISCELLANEOUS AND ORNAMENTAL
IRON TRADE CONTRACT REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
 - 1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:

2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.

2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.
3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 QUALITY ASSURANCE

- A. Company specializing in work described in the above listed individual specification Sections with minimum 5 years documented experience.

1.5 SEQUENCING

- A. Phasing: Refer to Section 01 10 00 - SUMMARY, and Drawings for phasing and milestone completion requirements which affect the Construction Manager's Work and the Work of this Trade Contract. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

- A. General: Miscellaneous and Ornamental Iron Trade Contractor shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work and all other Work requiring such equipment as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor.
 - 2. Miscellaneous and Ornamental Iron Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
 - 4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.2 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 – EXECUTION (NOT USED)

End of Section

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Section 05 12 00

STRUCTURAL STEEL

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK

- A. Work Included: This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on Drawings.
2. Miscellaneous Metal Fabrications are specified elsewhere in Division 5, Section 05 50 00, METAL FABRICATIONS.
3. Refer to Division 3, Section 03 30 00, CAST-IN-PLACE CONCRETE for anchor bolt installation in concrete.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of all the General and Subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that a Contractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated contractors of their responsibilities regardless of what alternate(s) are selected at no extra cost will be charged to the Owner. Refer to Section 01 23 00, ALTERNATES for the list and description of Alternates.

- C. Items To Be Installed Only: Not Applicable.

- D. Items To Be Furnished Only:

1. Furnish the following items for installation under designated Section:
 - a. Anchor bolts: Section 03 30 00, CAST-IN-PLACE CONCRETE
 - b. Leveling Plates: Section 03 30 00, CAST-IN-PLACE CONCRETE
 - c. Embedded Plates; Section 03 30 00, CAST-IN-PLACE CONCRETE
 - d. Brick Support Channel at Roofs; Section 04 20 00, UNIT MASONRY
 - e. Hoist Beam; Section 04 20 00, UNIT MASONRY

- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 01 43 39, MOCK-UPS.

2. Section 01 45 90, PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS.
3. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
4. Section 03 30 00, CAST-IN-PLACE CONCRETE.
5. Section 04 20 00, UNIT MASONRY; Masonry work.
6. Section 05 31 00, STEEL DECK.
7. Section 05 41 00, STEEL STUD SHEAR CONNECTORS
8. Section 05 50 00, METAL FABRICATIONS; Miscellaneous metals.
9. Section 07 00 01, WATERPROOFING, DAMPPROOFING, AND CAULKING.
10. Section 07 81 00, APPLIED FIREPROOFING

1.03 SUBMITTALS

- A. Refer to Section 01 33 00, SUBMITTAL PROCEDURES for submittal provisions and procedures.
- B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 2. Torque controlled high-strength bolts (each type), including nuts and washers. Include Direct Tension Indicators if used.
 3. Structural steel primer paint.
 4. Shrinkage-resistant grout.
- C. Shop drawings prepared under supervision of a licensed **Structural Engineer registered in Massachusetts**, including complete details and schedules for fabrication and assembly of structural steel members, procedures, diagrams, and design of connections not specifically shown on the drawings.
 1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
 3. Submit erection drawings for approval showing phasing of erection prior to start of any erection work.
 4. Structural Drawings shall not be used as erection drawings.
 5. Provide electronic copy and minimum of one full-size paper copy of each shop drawing. Refer to 01 33 00, SUBMITTALS, for additional submittal requirements.
- D. Electronic Submittals: Refer to Section 01 33 00 for Submittal Procedure. In addition, provide Engineer (1) fullsize paper print of each shop drawing, in addition to the electronic submittal. Paper copy will be retained by the Engineer and

electronic copy will be returned. Review cycle will not commence until paper copy of shop drawing has been received.

- E. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.
- F. Certified copies of each survey conducted by a licensed Land Surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations of major members. Indicate discrepancies between actual installation and contract documents.
- G. The Contractor shall maintain records of test results of welding procedures and records of welders employed, date of qualification, and identification symbol or mark. Such records shall be available for examination by the SER and testing Agency or certified copies submitted upon request to the SER and the Testing Agency.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
 - 1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges".
 - a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:

"This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings."
 - 2. AISC "Specifications for Structural Steel Buildings", including "Commentary".
 - 3. "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.
 - 4. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".
 - 5. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
 - 6. The Massachusetts State Building Code.
 - 7. AISC Quality Certification Program: The structural steel fabricator shall be AISC Certified, Category 1.
- B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
 - 1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
 - 2. If re-certification of welders is required, retesting will be Contractor's responsibility.

- C. No steel shall be erected without approved shop drawings. Any steel installed without prior approved shop drawings will be rejected and steel shall be removed and replaced.

1.05 TESTING AND INSPECTION

- A. Inspection, Testing, and Quality Control: A program of Inspection and Testing of structural steel work will be established by the Structural Engineer of Record (SER) who will direct the implementation of tests as carried out by an independent testing agency. All costs for inspection and testing shall be borne by the Owner.
- B. The materials and workmanship to be furnished under this Section shall be subject to inspection and testing in the mill, shop, and field by the SER and/or Testing Agency. Such inspection and testing shall not relieve the contractor of his responsibility to provide his own inspection and quality control and to furnish materials and workmanship in accordance with the requirements of the contract documents.
- C. The Contractor and Testing Agency shall examine the contract documents and become thoroughly acquainted with detailed inspection and testing requirements as outlined by the SER.
- D. The Contractor shall cooperate with and facilitate inspection and testing by the SER and /or Testing Agency. The Contractor shall, at his own expense, furnish the SER and/or the Testing Agency upon request, with the following:
 - 1. A complete set of reviewed erection drawings, detailed shop drawings, schedules, and corrective work procedures at the fabricating shop or shops in the field.
 - 2. Cutting list, order lists, material bills, and shipping lists.
 - 3. Information as to time and place of all rollings and shipment of material to shops.
 - 4. Representative sample pieces requested for testing.
 - 5. Assistance for testing materials and proper facilities for inspection of the work, in the mill, shop, and field.
- E. The Testing Agency shall inspect and test, as required by the SER, all welded and bolted work.
 - 1. Shop-Bolted Connections: Inspect or test in accordance with AISC Specifications.
 - 2. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - a. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

- b. Perform visual inspection of all welds.
- c. Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option.
 - 1) Liquid Penetrant Inspection: ASTM E 165.
 - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not acceptable.
 - 3) Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - 4) Ultrasonic Inspection: ASTM E 164.
- 3. Field-Bolted Connections: Inspect in accordance with AISC specifications.
 - a. For Direct Tension Indicators, comply with requirements of ASTM F 959. Verify that gaps are less than gaps specified in Table 2.
- 4. Field Welding: Inspect and test during erection of structural steel as follows:
 - a. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - b. Perform visual inspection of all welds.
 - c. Perform tests of welds as follows:
 - 1) Liquid Penetrant Inspection: ASTM E 165.
 - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not acceptable.
 - 3) Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - 4) Ultrasonic Inspection: ASTM E 164; 100% of Moment Connections shall be ultra-sonically inspected.
- F. Weldments and bolted connections that are required by the SER and/or the Testing Agency to be corrected shall be corrected without delay at the Contractor's expense and to the satisfaction of the SER and/or the Testing Agency. The SER of the Testing Agency shall require drawings showing proposed corrective work to be submitted for review.
- G. The Contractor shall notify the SER and/or the Testing Agency five (5) days prior to the shipment of any structural steel so that a paint inspection can be made. At these inspections the dry mill thickness of the paint film will be checked and steel containing mill scale that can easily be removed with the blade of a pocket knife will be subject to re-cleaning and repainting at the expense of the contractor.
- H. Any material or workmanship which is rejected by the SER and/or the Testing Agency either in the mill, shop, or field shall be replaced promptly by the Contractor to the satisfaction of the SER and/or the Testing Agency.

- I. The fact that steel work has been accepted at the shop shall not prevent its final rejection at the job site, even after it has been erected, if found to be defective in any way.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with Section 01 60 00, PRODUCT REQUIREMENTS.
- B. General Contractor shall provide and pay for all dumpster services during the entire construction period. Suppliers and Sub-Contractors to bring all rubbish and debris to the dumpster location daily. No costs are to be assessed to the suppliers or Sub-Contractors by the General Contractor for this service.
- C. General Contractor, Sub-Contractors, and suppliers are all individually to furnish their own staging, scaffolding, and hoisting equipment necessary to get workers, material, and equipment from the point of delivery at the project site to the point of use or installation within the building and project site. All crane and rigging services required are the responsibility of each individual trade.
- D. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- E. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.
- F. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and re-lubricate before use.
 - 1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.07 LEED Submittals- Refer to Section 01 81 13 "Sustainable Design Requirements."

- A. Project materials cost data: Provide statement indicating total cost for materials used for the Project.
- B. Sourcing of Raw Materials: Provide submittals indicating how the following requirements will be met (MRc3):
 - 1. List of proposed materials with recycled content: Manufacturers' certification of recycled content indicating percentage by weight of both pre-consumer and post-consumer recycled content. Include statement of costs.
 - 2. Submit required information using the LEED Data form for the following LEED items:
 - a. Local/Regional Materials:
 - 1) Sourcing location(s): Indicate location of extraction, harvesting and recovery of raw materials used in the products' manufacturing; indicate the distance between extraction, harvesting and recovery and the project site. Indicate percentage of product content from qualified locations.

- 2) Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
- C. Low-emitting Materials On-Site Wet-Applied Products inside the weatherproofing membrane (paints, coatings, sealants and adhesives): Provide submittals indicating how the following requirements will be met (IEQc2):
1. Adhesives, Sealants, Paints and Coatings:
 - a. VOC Content to comply with applicable chemical content requirements of SCAQMD Rule 1113- June 3, 2011 or CARB 2007 SCM (paints and coatings) and/or SCAQMD Rule 1168- July 1, 2005 (adhesives and sealants).
 - b. Emissions must comply with CDPH Standard Method v1.1-2010.
 - c. Materials tested/certified under the following programs will meet the emission requirements: Floorscore, SCS Indoor Advantage Gold, UL Greenguard Gold, and MAS Certified Green.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All steel is to consist of a minimum of 95% recycled steel with over 80% post-consumer and 15% pre-consumer recycled content in compliance with LEED requirements.
- B. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.
- C. Structural Steel Shapes: ASTM A992.
- D. Plates and Bars: ASTM A36
- E. Cold-Formed Steel Tubing: ASTM A 500, Grade B.
- F. Hot-Formed Steel Tubing: ASTM A 501.
- G. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.
 1. Finish: Black, except where indicated to be galvanized.
- H. Anchor Bolts: ASTM F1554 (Grade 55), non-headed type unless otherwise indicated.
- I. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A 325, or ASTM F1852, torque controlled.
 - a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot-dip galvanized complying with ASTM A 153.

2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A 490, or ASTM 2280, torque controlled.
- J. Electrodes for Welding: Comply with AWS Code.
- K. Structural Steel Primer Paint (steel not scheduled to receive spray-on fire proofing or intumescent coating): Tnemec Company Series V10 #1009 Gray metal primer, or Sherwin Williams Steel Spec Structural Steel Primer B50AV11 Gray metal primer, or approved equal compatible with finish paint systems listed under Section 09 91 23 Interior Painting Schedule.
- L. Structural Steel Primer Paint (steel scheduled to receive intumescent coating): Alkyd primer compatible with intumescent coating systems listed under Section 07 81 23 Intumescent Fireproofing.
- M. Non-metallic Shrinkage-Resistant Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.
- N. Thermal Break Pad: Fiberglass-Reinforced Laminate Composite with the following minimum properties:
- | | | |
|-------------------------------------|------------|-----------------------------------|
| 1. Tensile Strength | ASTM D638 | 11,000 psi |
| 2. Flexural Strength | ASTM D790 | 25,000 psi |
| 3. Compressive Strength | ASTM D695 | 38,900 psi |
| 4. Compressive Modulus (1/2") | ASTM D695 | 291,194 psi |
| 5. Shear Strength | ASTM D732 | 15,000 psi |
| 6. Oxygen Index | ASTM D2863 | 21.8% |
| 7. Coefficient of Thermal Expansion | ASTM D696 | 2.2 |
| 8. Thermal Conductivity | ASTM C177 | 1.8 BTU/Hr/ft ² /in/°F |
| 9. Density | | 107.83 lb/ft ³ |

2.02 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.
1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.
1. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.

2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.
- C. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or ASTM A 490 Bolts".
- D. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- E. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- F. Steel Wall Framing: Select members that are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square, and true members in completed wall framing.
- G. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
- H. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.
- O. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
- P. Corrective Work: Structural steel members or assemblages having fabrication errors, which exceed permissible tolerances, shall be corrected only if permitted by the SER. All corrective work shall be in accordance with AISC and AWS requirements. When requested by the SER or the Testing Agency, the Contractor shall submit to the Architect and/or SER for approval, drawings showing details of proposed corrective work and shall receive approved drawing prior to performing the corrective work. All corrective work shall be solely at Contractor's expense.
- Q. Architecturally Exposed Structural Steel: Shop fabricate and assemble AESS to the maximum extent possible. Locate joints at concealed locations, if possible. Comply with the following:
- a. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale and roughness.
 - b. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
 - c. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
 - d. Fabricate AESS with exposed surfaces free of seams to maximum amount possible.
 - e. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 - f. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.

- g. Fabricate AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
- h. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for AESS.
- i. Provide continuous welds of uniform size where AESS is welded.
- j. Remove backing bars or run-off tabs, back-gouge welds and grind smooth for AESS.
- k. Grind butt and groove welds flush to adjacent surfaces within a tolerance of plus 1/16-inch, minus 0 inch for AESS.
- l. Make fillet welds oversize and grind to uniform profile with smooth face and transition.
- m. No external materials shall be welded to the steel that require removal in the field (Example- nuts for safety cables).

2.03 SHOP PAINTING

- A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial two (2) inches of embedded areas only.
 - 1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 - 2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
 - 3. Do not paint top flanges of beams that receive shear studs.
 - 4. Apply two (2) coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
 - 5. Primer at steel scheduled to receive intumescent coating is to be compatible with intumescent coating.
- B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
 - 1. For non-galvanized, non-Architecturally Exposed Structural Steel: SP-2 "Hand Tool Cleaning" or SP-3 "Power Tool Cleaning."
 - 2. For non-galvanized Architecturally Exposed Structural Steel: SP-6 "Commercial Blast Cleaning."
 - 3. For galvanized structural steel scheduled to receive a primer: SP-1 "Solvent Cleaning", the SP-7 "Brush-off Blast Cleaning" after galvanizing. The SP-7 shall be performed lightly so as to only profile the surface for the subsequent paint applications. Do not remove the zinc coating in this process.
 - 4. For galvanized structural steel not scheduled to receive a primer: SP-1 "Solvent Cleaning."
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 2.0 mils. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.

- D. Galvanizing, where indicated, shall be hot dipped galvanizing after fabrication in accordance with ASTM Specification A123 and neutralized ready for paint where applied. Galvanized members embedded or attached to concrete shall be dipped in a 0.2% chromic acid solution.
- E. **Hot-dipped galvanized steel scheduled for field applied finish paint:**
1. **Touch-up all breaks on hot-dipped surfaces caused by cutting, welding, drilling, or undue abrasion with zinc rich paint. Apply zinc rich paint in two coats to a total dry film thickness of not less than 3 mils.**
 2. **Provide factory-applied polyamide epoxy primer, 2.0 mils dry film thickness minimum, "Primergalv" by Duncan Galvanizing or approved equal compatible with finish paint system. Apply primer within 12 hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations, and as recommended by coating manufacturer. Engage the services of a galvanizing facility which will assume single-source responsibility for galvanizing and primer coating.**
 3. **Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet. (Add. 5)**

2.04 SOURCE QUALITY CONTROL

- A. General: The Contractor shall maintain his own quality control and inspection of all shop and field work. Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
1. Promptly remove and replace materials or fabricated components that do not comply.
- B. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
1. Connection design not specifically shown on the contract drawings is included herein as part of this subcontractor's work.

PART 3 EXECUTION

3.01 ERECTION

- A. Surveys: Employ a licensed Land Surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with Architect.
- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final

- connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.
- D. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 4. For proprietary grout materials, comply with manufacturer's instructions.
- E. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- F. Level and plumb individual members of structure within specified AISC tolerances.
- G. Splice members only where indicated and accepted on shop drawings.
- H. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- I. Gas Cutting: Do not use gas-cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to SER. Finish gas-cut sections equal to a sheared appearance when permitted.
- J. Architecturally Exposed Structural Steel: Erect AESS members with nylon slings or other methods that will not damage AESS surfaces.
1. Erect AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 2. Do not thermally cut during erection.

- K. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.02 AFFIDAVIT

- A. The General Contractor shall, upon the completion of the steel work, submit to the SER an affidavit certifying that he has supervised the steel construction and that it is in accordance with the structural plans and specifications.

END OF SECTION

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SECTION 05 21 00

STEEL JOISTS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.
- B. Sustainable Design Intent: Comply with project requirements intended to achieve the intended certification, measured and documented according to the MA CHPS rating system.

1.02 DESCRIPTION OF WORK

- A. Furnish and install all steel joists, bridging, bearing plates, and all related work indicated on the drawings and herein specified
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of all the General and subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective sections. In the event that a contractor feels that any alternate or alternates do reflect a cost difference, additional or a deduction, in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate and/or alternates as provided for in the bid proposal. Failure to do so will in no way relieve the hereinbefore stated contractors of their responsibilities regardless of what alternate and/or alternates are selected and no extra cost will be charged to the Owner. Refer to Section 01 23 00, ALTERNATES for list and description of alternates.
- C. Items To Be Installed Only: Not Applicable.
- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
 - 1. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS
 - 2. Section 03 30 00, CAST-IN-PLACE CONCRETE.
 - 3. Section 04 22 00, CONCRETE UNIT MASONRY.
 - 4. Section 05 12 00, STRUCTURAL STEEL.
 - 5. Section 05 31 00, STEEL DECK.
 - 6. Section 05 50 00, METAL FABRICATIONS.
 - 7. Section 06 10 00, ROUGH CARPENTRY.
 - 8. Section 07 25 50, CEMENTITIOUS FIREPROOFING.
 - 9. Section 09 91 00, PAINTING.

1.03 SUBMITTALS

-
- A. Refer to Section 01 30 00, SUBMITTALS for submittal provisions and procedures.
 - B. Furnish certificates that the joists as furnished meet the Standard Specifications for Steel Joists, as given in the handbook, "Steel Joist Construction," as published by the Steel Joist Institute, latest edition, and are a product approved by the Steel Joist Institute.
 - C. Submit detailed Shop and Erection Drawings showing sizes, layout of joists, special connections, jointing and accessories. Include the mark, number, type, location and spacing of joists and bridging.
 - D. Electronic Submittals: Refer to Section 01 33 00 for Submittal Procedure. In addition, provide Engineer (1) fullsize paper print of each shop drawing, in addition to the electronic submittal. Paper copy will be retained by the Engineer and electronic copy will be returned. Review cycle will not commence until paper copy of shop drawing has been received.
 - E. Special attachments where detailed or indicated as part of the steel joists shall be provided, also necessary headers for ducts, and ceiling extensions of proper size for ceilings.
 - F. All roof joists pitched in excess of 1/4" per foot shall have their seats fabricated to allow full bearing on the supporting member.
 - G. 3D Model: Submit 3D model with true member sizes and configurations for BIM coordination with MEPFP trades.
- 1.04 QUALITY ASSURANCE
- A. Standards:
 - 1. Steel joists shall be designed, fabricated and erected in accordance with Standard Specifications for Steel Joists of Steel Joist Institute, latest edition.
 - 2. American Welding Society Structural Welding Code, latest edition.
 - B. The open web steel joists shall be furnished by a manufacturer who shall have a Steel Joist Institute design and production approval for all the specific joists designations employed on the project's structural drawings. All joists shall be manufactured and installed in accordance with these approvals and with the Standard Specifications adopted by the Steel Joist Institute as amended to date.
 - C. All welding shall be done in accordance with the current edition of the American Welding Society "Structural Welding Code - Steel", AWS D1.1 except as modified by the current edition of the Steel Joist Institute "Technical Digest No. 8 Welding of Open Web Joists".
- 1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. All structural steel joists, bridging, and accessories shall be unloaded, handled, and stored in such a manner as not to cause damage or distortion to the members.

- B. Structural steel joists, bridging, and accessories which are stored at the project site shall be above ground on platforms, skids or other supports protected from the elements by a waterproof covering ventilated to prevent condensation.

1.06 GUARANTEES

- A. The Contractor shall guarantee all workmanship to be free from defects for a period of one (1) year after the date of substantial completion.
- B. Supply all manufacturer's standard guarantees and warranties.

1.07 TESTING AND INSPECTION

- A. A program of Inspection and Testing of steel joist work will be established by the Structural Engineer of Record (SER) who will direct the implementation of tests as carried out by an independent testing agency. All costs for inspection and testing shall be borne by the Owner.
- B. The materials and workmanship to be furnished under this Section shall be subject to inspection in the shop and field by the SER and/or the testing agency. Such inspection shall not relieve the Contractor of his requirements to furnish materials and workmanship in accordance with requirements of the Contract Documents.
- C. Access shall be provided for inspection of all facilities by the SER and/or the testing agency and the fabricator shall, when requested, aid the inspectors in carrying out their duties.
- D. The testing agency will report test results promptly and in writing to Contractor and Architect/SER.
- E. Remove and replace work that does not comply with specified requirements.
- F. Additional testing will be performed to check compliance of corrected work with specified requirements.

1.08 LEED Submittals- Refer to Section 01 81 13 "Sustainable Design Requirements."

- A. Project materials cost data: Provide statement indicating total cost for materials used for the Project.
- B. Sourcing of Raw Materials: Provide submittals indicating how the following requirements will be met (MRc3):
 - 1. List of proposed materials with recycled content: Manufacturers' certification of recycled content indicating percentage by weight of both pre-consumer and post-consumer recycled content. Include statement of costs.
 - 2. Submit required information using the LEED Data form for the following LEED items:
 - a. Local/Regional Materials:
 - 1) Sourcing location(s): Indicate location of extraction, harvesting and recovery of raw materials used in the products' manufacturing; indicate the distance between extraction, harvesting and recovery and the project site. Indicate percentage of product content from qualified locations.

- 2) Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
- C. Low-emitting Materials On-Site Wet-Applied Products inside the weatherproofing membrane (paints, coatings, sealants and adhesives): Provide submittals indicating how the following requirements will be met (IEQc2):
1. Adhesives, Sealants, Paints and Coatings:
 - a. VOC Content to comply with applicable chemical content requirements of SCAQMD Rule 1113- June 3, 2011 or CARB 2007 SCM (paints and coatings) and/or SCAQMD Rule 1168- July 1, 2005 (adhesives and sealants).
 - b. Emissions must comply with CDPH Standard Method v1.1-2010.
 - c. Materials tested/certified under the following programs will meet the emission requirements: Floorscore, SCS Indoor Advantage Gold, UL Greenguard Gold, and MAS Certified Green.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Canam Steel Corporation
Nucor Corporation
Vulcraft Division
New Millennium Building Systems

2.02 MATERIALS

- A. All steel is to consist of a minimum of 95% recycled steel with over 80% post-consumer and 15% pre-consumer recycled content in compliance with LEED requirements.
- B. Steel Joists: Shall be joists as manufactured by an acceptable manufacturer whose operations and welding methods have been approved by the Steel Joist Institute, and are regularly inspected by the Institute.
 1. Special attachments where detailed or indicated as part of the steel joists, necessary headers for ducts, ceiling extensions of proper size for ceilings, shall be provided.
 2. All roof joists pitched in excess of 1/4" per foot shall have their seats fabricated to allow full bearing on the supporting member.
- C. Shop Primer: Standard gray rust-inhibitive primer paint used by manufacturer of the joists. [Exposed joists shall have gray Tnemec Series 10-1009 primer or approved equivalent.]
- D. Provide bridging, end anchorages, headers, and clips for a complete installation.
- E. Provide all chord extensions indicated to have a load carrying capacity at least equal to loads shown on the drawings or the uniform load capacity of the main joist span.

- F. Camber joists to accommodate for dead load deflection.

PART 3 EXECUTION

3.01 PAINTING

- A. Shop prime joists one coat.
- B. Spot prime field rivets, bolts, welds and abrasions to shop coat with same primer used in shop.
- C. Architecturally Exposed joists shall be sandblasted in accordance with SSPC-SP6, Commercial Blast Clean, after fabrication and prior to painting.

3.02 ERECTION

- A. Set joists true, and so secure as to remain during placing of deck.
- B. All joists shall be erected in strict accordance with the Standard Specifications for Steel Joists of the Steel Joist Institute with revisions to date.
- C. Handle joists with care. At all times, they shall be supported at two or more points and shall be protected from dampness.
- D. Do not use damaged joists.
- E. Space all joists accurately in position with minimum bearing of 2-1/2" for K-series joists bearing on steel and 4" on masonry or concrete or as shown on the plans. . Spacing shall be as indicated on plans.
- F. Fasten all joists in place and install permanent bridging before any construction load, except the weight of the necessary workmen to install bridging, is placed upon joists.
- G. Check joist locations for interference with mechanical trades before erection. Report any conflicts with openings, pipes, and equipment ducts immediately to Architect.
- H. All welding shall be in accordance with AWS D1.1.
- I. Field welding shall be executed only by welding operators who have been previously qualified to perform the type of work involved. Certificate Numbers of all weldings shall be filed with the Architect.
- J. K-Series joists shall be welded to steel supports with two (2) 1/8 in. welds each at least one (1) inch long or bolted with two (2) 1/2" diameter bolts. Welds shall be parallel to the joist span.
- K. Sloped joists shall be bolted at the high end using 1/2" diameter (minimum) bolts in 9/16" diameter holes. Low-end holes may be slotted.

- L. Coordinate proper placement of anchorages in concrete and masonry construction as required for the support of bearing plates and angles.

END OF SECTION

SECTION 05 31 00

STEEL DECK

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK

- A. Work Included: This Section includes the following:
1. Steel roof deck.
 2. Cellular acoustical steel roof deck.
 3. Composite steel floor deck.
 4. Steel form deck.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of all the General and Subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that a Contractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated contractors of their responsibilities regardless of what alternate(s) are selected at no extra cost will be charged to the Owner. Refer to Section 01 23 00, ALTERNATES for the list and description of Alternates.
- C. Items To Be Installed Only: Not Applicable.
- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 01 43 39, MOCK-UPS.
 2. Section 01 45 90, PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS.
 3. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
 4. Section 03 30 00, CAST-IN-PLACE CONCRETE.
 5. Section 04 20 00, UNIT MASONRY; Masonry work.
 6. Section 05 12 00, STRUCTURAL STEEL; Structural steel.
 7. Section 05 41 00, STEEL STUD SHEAR CONNECTORS
 8. Section 07 92 00, JOINT SEALANTS.

1.03 SUBMITTALS

- A. Refer to Section 01 33 00, SUBMITTAL PROCEDURES for submittal provisions and procedures.
- B. Manufacturer: The designations of deck used on the drawings are those from the catalog of United Steel Deck, Inc. The designations are used for convenience only, and other manufacturers who make the same profile of deck and conform to the design standards may be acceptable.
- C. Product data for each type of deck, accessory, and product specified.
- D. Shop drawings showing layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.
- E. Electronic Submittals: Refer to Section 01 33 00 for Submittal Procedure. In addition, provide Engineer (1) fullsize paper print of each shop drawing, in addition to the electronic submittal. Paper copy will be retained by the Engineer and electronic copy will be returned. Review cycle will not commence until paper copy of shop drawing has been received.
- F. No fabrication shall take place until the shop drawings have been reviewed.
- G. All welds shall be indicated by AWS Welding Symbols.
- H. The General Contractor shall check the shop drawings and shall indicate in colored pencil his corrections for modifications for the other trades, holes, and necessary field dimensions before forwarding them to the Architect/SER for review.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:
 - 1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members".
 - 2. American Welding Society (AWS), D1.3 "Structural Welding Code - Steel Sheet".
 - 3. Steel Deck Institute (SDI), "Design Manual for Composite Deck, Form Decks, and Roof Decks".
 - 4. The Massachusetts State Building Code.
- B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS
- C. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.
- D. FM Listing: Provide steel roof deck units that have been evaluated by Factory Mutual System and are listed in "Factory Mutual Guide" for "Class I".

1.05 TESTING AND INSPECTION

- A. A program of Inspection and Testing of steel decking work will be established by the Structural Engineer of Record (SER) who will direct the implementation of tests as carried out by an independent testing agency. All costs for inspection and testing shall be borne by the Owner.
- B. The materials and workmanship to be furnished under this Section shall be subject to inspection in the shop and field by the SER and/or the testing agency. Such inspection shall not relieve the Contractor of his requirements to furnish materials and workmanship in accordance with requirements of the Contract Documents.
- C. Access shall be provided for inspection of all facilities by the SER and/or the testing agency and the fabricator shall, when requested, aid the inspectors in carrying out their duties.
- D. The testing agency will report test results promptly and in writing to Contractor and Architect/SER.
- E. Remove and replace work that does not comply with specified requirements.
- F. Additional testing will be performed to check compliance of corrected work with specified requirements.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with Section 01 60 00, MATERIAL AND EQUIPMENT.
- B. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- C. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
- D. All deformed or damaged panels shall be removed from the site and replaced at no additional expense to the Owner.

1.07 LEED Submittals- Refer to Section 01 81 13 "Sustainable Design Requirements."

- A. Project materials cost data: Provide statement indicating total cost for materials used for the Project.
- B. Sourcing of Raw Materials: Provide submittals indicating how the following requirements will be met (MRc3):
 - 1. List of proposed materials with recycled content: Manufacturers' certification of recycled content indicating percentage by weight of both pre-consumer and post-consumer recycled content. Include statement of costs.
 - 2. Submit required information using the LEED Data form for the following LEED items:
 - a. Local/Regional Materials:
 - 1) Sourcing location(s): Indicate location of extraction, harvesting and recovery of raw materials used in the products' manufacturing; indicate the distance between

galvanized steel sheets. All decking shall conform to ASTM A 245 or A 446 and shall be hot-dipped galvanized in accordance with ASTM A 93 or A 361.

2. The formed roof decking shall have section properties not less than the following:

<u>Type Deck</u>	<u>Section Modulus</u>	<u>Moment of Inertia</u>
B – 22 Gauge	0.19 in. ³	0.17 in. ⁴
B – 20 Gauge	0.25 in. ³	0.22 in. ⁴
B – 18 Gauge	0.34 in. ³	0.31 in. ⁴
NI – 20 Gauge	0.49 in. ³	0.82 in. ⁴
NIA – 20 Gauge	0.49 in. ³	0.82 in. ⁴

3. The above values are per foot of width and shall be determined by computing in accordance with the American Iron and Steel Institute's "Specifications" for the design of light gage cold-formed steel structural members.

D. Cellular Acoustical Steel Roof Deck

1. Cellular roof decking to be furnished and installed shall be formed of 3" deep x 20/20 gauge minimum with ribs 8 in. on center. All cellular decking shall conform to ASTM A 653/S 653M, Structural Steel, Grade 33, G60 zinc coating. Finish shall be hot dipped galvanized, treated with an organic chromate finish, clear vinyl preparation, and a thermosetting rust inhibiting roller coated primer and cured in a catenary oven at temperatures in excess of 400 degrees F., prior to forming.
2. The formed roof decking shall have section properties not less than the following:

<u>Type Deck</u>	<u>Section Modulus</u>	<u>Moment of Inertia</u>
3" Type NCA- 20/20 Gauge	0.60 in. ³	1.45 in. ⁴

3. The above values are per foot of width and shall be determined by computing in accordance with the American Iron and Steel Institute's "Specifications" for the design of light gage cold-formed steel structural members.
4. Cellular deck shall have a minimum noise reduction coefficient of 0.85 for NCA and shall be furnished complete with integral sound insulation.
5. Cellular deck shall include perforated liner panel

E. Non-Composite Form Deck:

1. Non-Composite steel form deck to be furnished and installed shall be formed of 1 in. deep 20 gauge fluted, Type UF1X formed galvanized steel sheets. All decking shall conform to ASTM A 563.
2. The non-composite form decking shall have section properties not less than the following:

<u>Type Deck</u>	<u>Section Modulus(S_p)</u>	<u>Moment of Inertia(I_p)</u>
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UF1X – 22 Gauge

0.125 in.³

0.070 in.⁴

3. The above values are per foot of width and shall be determined by computing in accordance with the American Iron and Steel Institute's "Specifications" for the design of light gage cold-formed steel structural members.

2.02 ACCESSORIES

- A. General: Provide accessory materials for steel deck that comply with requirements indicated and recommendations of the steel deck manufacturer.
- B. Mechanical Fasteners: Manufacturers self-drilling, self-threading screws.
- C. Side Lap Fasteners: Manufacturer's standard, corrosion-resistant, hexagonal washer head; self-drilling, carbon steel screws, No. 12 minimum diameter.
- D. Rib Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.
- E. Sound-Absorbing Insulation: Manufacturer's standard pre-molded roll or strip glass fiber or mineral fiber.
- F. Miscellaneous Roof Deck Accessories: Steel sheet, 0.0359 inch (0.91-mm) thick minimum ridge and valley plates, finish strips, and reinforcing channels, of same material as roof deck.
- G. Pour Stops and Girder Fillers: Steel sheet, of same material as deck panels, and of thickness and profile indicated.
- H. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material and thickness as deck panels, unless otherwise indicated.
- I. Washers: Manufacturer's standard uncoated-steel sheet weld washers, shaped to fit deck rib, 0.0598 inch (1.5 mm) thick with 3/8-inch (9.5 mm) minimum diameter pre-punched hole.
- J. Sump Pans: Manufacturer's standard size, single piece steel sheet 0.071-inch (1.8-mm) thick minimum, of same material as deck panels, with 1-1/2-inch (38-mm) minimum deep level recessed pans and 3-inch (76 mm) wide flanges. Cut holes for drains in the field.
- K. Steel Sheet Accessories: ASTM A 446, G 60 (ASTM A 446M, Z 180) coating class, galvanized according to ASTM A 525 (ASTM A 525M).
- L. Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

3.02 PREPARATION

- A. Do not place deck panels on concrete supporting structure until concrete has cured and is dry.
- B. Locate decking bundles to prevent overloading of supporting members.

3.03 INSTALLATION - GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary of SDI Publication No. 28, manufacturer's recommendations, and requirements of this Section.
- B. Install temporary shoring before placing deck panels when required to meet deflection limitations.
- C. Place deck panels on supporting framing and adjust to final position with ends accurately aligned and bearing on supporting framing before being permanently fastened. Do not stretch or contract side lap interlocks.
- D. Place deck panels flat and square and fasten to supporting framing without warp or deflection.
- E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to the decking.
- F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
- G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
- H. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's instructions.

3.04 ROOF DECK INSTALLATION

- A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches long, and as follows:
 - 1. Weld Diameter: 3/4 inch, nominal.
 - 2. Weld Spacing: Weld edge ribs of panels at each support. Space welds an average of 12 inches apart, with a minimum of two welds per unit at each support.
 - 3. Weld Washers: Install weld washers at each weld location where recommended by deck manufacturer.
- B. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 36 inches, using one of the following methods:

1. Mechanically fasten with self-drilling No. 12 or larger carbon steel screws. Fasten with 1-1/2-inch long minimum welds.
- C. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints lapped 2 inches.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking, and weld flanges to top of deck.
- E. Space welds not more than 12 inches apart with at least one weld at each corner.
- F. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's recommendations. Weld to substrate to provide a complete deck installation.
- G. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's instructions to ensure complete closure.
- H. Acoustic Batts: Install acoustic batts in cellular acoustic roof decks.

3.05 FLOOR DECK INSTALLATION

- A. Fasten floor deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 1. Weld Diameter: 3/4 inch, nominal.
 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
- B. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, or at intervals not exceeding 36 inches, using one of the following methods:
 1. Mechanically fasten with self-drilling No. 12 or larger carbon steel screws. Mechanically clinch or button punch. Fasten with 1-1/2-inch long minimum welds.
- C. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints as follows butted.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck according to SDI recommendations to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels, unless otherwise indicated.

3.07 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780 and the manufacturer's instructions.
- B. Provide final protection and maintain conditions to ensure steel decking is without damage or deterioration at time of Substantial Completion.

END OF SECTION

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Section 05 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Design, engineer, furnish and install metal framing and support system for the following applications:
 - 1. Load bearing formed steel stud exterior wall framing
 - 2. Load bearing formed steel stud at designated interior walls for partitions greater than 16 feet in height, floor to underside of structural decking.
 - 3. Framing for exterior fascias, soffits and ceilings.
 - 4. All tracks, connections, bracing, bridging and accessories.
 - 5. Sill sealer.
 - 6. Coordinate work of this Section with Section 23 00 00 – HVAC for required stud spacing and locations of vertical ductwork in exterior walls.
 - 7. Z-furring stud wall attachment clips.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.

- F. Section 04 20 00 - UNIT MASONRY: Veneer masonry supported by wall stud metal framing.
- G. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural building framing.
- H. Section 05 31 00 - STEEL DECKING: Metal floor decking, metal roof decking.
- I. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and curbing.
- J. Section 06 16 00 - SHEATHING: Exterior wall sheathing.
- K. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Head and sill flashings.
- L. Section 07 92 00 - JOINT SEALANTS.
- M. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Light weight, non-load bearing metal stud framing.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI - Cold-Formed Steel Design Manual.
 - 2. ASTM A123 - Zinc Coatings on Iron and Steel Products.
 - 3. ASTM A645 - Steel Sheet, Pressure Vessel Plates, Five Percent Nickel Alloy Steel, Specially Heat Treated.
 - 4. ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 5. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 6. ASTM C1513 Standard Specification For Steel Tapping Screws For Cold-Formed Steel Framing Connections
 - 7. ASTM C955 Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
 - 8. AWC: Specifications Guide for Cold Formed Steel Structural Members.
 - 9. AWS A 2.0 - Standard Welding Symbols.
 - 10. AWS D 1.3 - Light Steel Welding Code.
 - 11. SSPC Steel Structures Painting Manual.
 - 12. SSMA: Cold Formed Steel Details.

1.4 SYSTEM DESCRIPTION

- A. Structural performance: Design, engineer and provide a complete metal framing and support system having deflection limits as specified herein under the full inward and outward lateral load prescribed by applicable codes for this project location. Deflection and structural calculations shall not include any structural benefit from wall veneer materials; metal framing alone shall carry the loads.

Where a member supports more than one finish, the most restrictive deflection shall govern.

1. Design wall system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 2. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 3. Deflection limits
 - a. Exterior wall framing: Deflection limit for masonry veneer: $L/600$ where L is the length of the steel member. Design wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
 - b. Interior load-bearing wall framing: Horizontal deflection of $1/360$ of the wall height.
 - c. Ceiling joist framing: Vertical deflection of $1/360$ of the span.
- B. Loads: Design light gage metal framing and connections to support total loads including dead loads, live loads, earthquake loads, thermal loads, wind loads and other loads as prescribed by the governing building code by reference standards, and as described herein.
1. Pressures and loads used for design shall satisfy the building code, but shall not be less than the minimum values specified below. Where permitted by code, the sum of the dead load, live load, and wind (or earthquake) load may be multiplied by an allowable reduction factor. Other load combinations, and single loads, shall not to be reduced. An allowable stress increase of one third, or any other value, shall not be used in conjunction with a reduced load combination.
 2. Wind pressures shall be assumed to act perpendicular to flat surfaces supported by light gage metal framing, regardless of the surface orientation. Wind pressures shall be assumed to act perpendicular to tangents of curved surfaces. At corners and other changes in plane, both surfaces shall be assumed to experience their inward design pressures simultaneously, and their outward design pressures simultaneously. Design for simultaneous occurrence of inward design pressure on one surface, and outward design pressure on the adjoining surface, is not required.
 3. Light gage metal framing must also carry dead, wind and earthquake loads and live loads from work specified in other sections supported by light gage metal framing.
 4. Wind and snow loading: Masonry veneer wall system shall conform to the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments for snow and wind loading.
 5. Seismic loads shall be based on the seismic provisions contained in applicable codes.
- C. Welding: Employ experienced welders who are certified in compliance with AWS Standard Qualification Procedures.
- D. Engineering: Provide the services of a Professional Engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this section

meets or exceeds the performance requirements specified in this section and as required by the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and limitations on standard framing members and other products furnished hereunder.
 2. Provide calculations for loadings and stresses of exterior wall framing under the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements have been satisfied.
 3. Manufacturer's installation instructions: Indicate special procedures, and conditions requiring special attention.
 4. Shop drawings:
 - a. Large scale design details showing component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related work.
 - b. Detail all conditions which deviate from Contract Documents
 - c. Describe method for securing studs to tracks and for bolted and welded framing connections.
 - d. Show Z-furring stud wall attachment clips.
 5. Prior to prefabrication of framing, submit fabrication and erection drawings for approval. All calculations and details are to be submitted for all members and connections.
- B. LEED Submittal Requirements:
1. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 2. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 3. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 4. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.

- 5. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content
 - C. Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, the following
 - 1. All certifications, reports and programs required by the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments for work engineered by Contractor's Profession Engineer under the requirements of this Section.
- 1.6 QUALITY ASSURANCE
- A. Calculate structural properties of framing members in accordance with AWC1, MF/SLA and AWS D 1.3 requirements.
 - 1. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- 1.7 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.
 - B. Installer: Company with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
 - C. Welders Certificates: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
 - D. Licensed Professionals: Professional Engineer, registered in the Commonwealth of Massachusetts.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
 - B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.9 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Clark-Western Building Systems, West Chester OH.
 - 2. Dietrich Industries, Inc., Pittsburgh PA.
 - 3. Marino-Ware Industries Corp., South Plainfield NJ.
 - 4. Steel Elements, Gorham NH.
 - 5. The Steel Network (TSN), Las Vegas NV.
- B. Recycled content of steel: Use maximum available percentage of recycled steel. Steel framing products incorporated into the work shall contain not less than 30 percent of recycled steel.
- C. Steel sheet for framing: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Framing:
 - a. Grade: As required by structural performance but not less than 18 gauge thickness.
 - 1) Coating: G90 (Z275).
- D. Steel sheet for connectors: ASTM A 570/A 570M, hot rolled or ASTM A 611, cold rolled; cleaned, pretreated, and primed with manufacturer's baked-on, lead- and chromate-free, rust-inhibitive primer complying with performance requirements in FS TT-P-664, of grade as follows:
 - 1. Connectors:
 - a. Grade: As required by structural performance but not less than 18 gauge thickness.
 - 1) Coating: G90 (Z275).

2.2 FRAMING MEMBERS

- A. Studs: Manufacturer's standard C-shaped steel studs complying with ASTM C 955. Formed of ASTM A-653/653M steel, G90 (Z275) galvanized, channel shaped with lipped flanges, punched web, size as shown on Drawings, thickness and grade as required by structural design calculations but in no case less than 18 gauge.
- B. Tracks: Manufacturer's standard U-shaped steel track complying with ASTM C 955. Formed of ASTM A-653/653M steel, same designation, coating, and thickness as studs except as otherwise noted, channel shaped, solid web, depth compatible with

studs, size, thickness and grade as required by structural design calculations but in no case less than 18 gauge.

1. Track at exterior walls: Provide specified track with 4 inch high vertical legs at all locations.
- C. Joists and Rafters: Manufacturer's standard C-shaped steel joists, of web depths indicated, complying with ASTM C 955. Formed of ASTM A 653/653M steel, G90 (Z275) galvanized, channel shaped with lipped flanges, solid web, size as shown on Drawings, thickness and grade as required by structural design calculations.
- D. Drift and Vertical Deflection Clips: Manufacturer's standard bypass and head clips as required, capable of isolating wall stud from upward and downward vertical displacement of primary structure using mechanical fasteners.
1. Provide clips with step bushings. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement. 68 mils (1.72 mm) minimum thickness. Size of clips shall be as required by structural design calculations performed by clip manufacturer, and reviewed by specified Engineering Licensed Professional stamping Shop Drawings. Clips shall be fabricated/designed for the following conditions:
 - a. Exterior head of wall.
 - b. Exterior head of wall pre-assembled with track.
 - c. By-pass structural pour stop at floor slab.
 - d. By-pass floor slab or structure.
 - e. By-pass structure.

2.3 ANCHORS AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Mechanical Fasteners for steel: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
1. Head Type: Low-profile head beneath insulated metal wall panel and sheathing, manufacturer's standard elsewhere.
- E. Mechanical Fasteners for aluminum: Type 304 stainless steel, self-drilling, self-threading steel drill screws.
1. Head Type: Manufacturer's standard.
- F. Welding Electrodes: Comply with AWS standards.

2.4 MISCELLANEOUS MATERIALS

- A. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.
 - 1. VOC limit: 250 g/L or less.
 - 2. Specified manufacturer and product: ZRC Worldwide, Marshfield MA, product "ZRC-221".
- B. Sill sealer gasket: Moisture resistant sill plate gasket made of polyethylene foam installed under metal stud track above foundation wall equal to:
 - 1. 1. Kingspan, GreenGuard Sill Sealer
 - 2. 2. Owens Corning, FoamSeal R Sill Plate Gasket
 - 3. 3. Dow, Styrofoam Brand Sill Seal Foam Gasket

2.5 PRE-ERECTION FABRICATION

- A. Framing components may be pre-assembled into panels prior to erecting. Fabricate panels square with framing members fitted, reinforced, and braced to suit design requirements; attach components in a manner to prevent racking.
- B. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect previous work, related work, and conditions under which this work is to be performed and notify Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work.
- B. Beginning of installation means acceptance of existing substrates, previous work and conditions.

3.2 ERECTION - GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.
- C. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
 - 1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed metal framing members by welding or screw fastening, as indicated on approved Shop Drawings, or where not indicated, as standard with fabricator. Wire tying or clip fasteners of framing members is not permitted.
 - a. Where welding is indicated or required on approved Shop Drawings: Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to approved Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
 - D. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.
 - E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
 - F. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
 - G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
 - H. Accurately align and attach runners in strict compliance with manufacturer's recommendations and approved shop drawings. . Allow for main structure deflection at top runner to avoid transferring load stud system.
 1. Frame wall openings with additional framing members at perimeter of openings as needed.
 2. Align holes in framing members to facilitate electrical conduit and piping work.
 3. Provide all needed connections and accessories provide a complete structural system.
 4. Provide all needed members for proper fastening interior gypsum wallboard.
 - I. Bracing: Provide continuous 1-1/2 inch cold-rolled channel horizontal bracing within 10 to 12 inches of tops of stud. Connect bracing to each stud as indicated on approved shop drawings. Provide additional bridging and bracing as recommended by manufacturer, as necessary, and as indicated on approved shop drawings. Provide kick-back bracing perpendicular to plane of framing system and securely anchored to building structure needed to create a complete structural system meeting specified performance requirements.
 - J. Touch-up damaged metal coatings, with galvanize repair paint.
- 3.3 ERECTION OF STUDDING
- A. Install components in accordance with manufacturer's instructions and in accordance with

- B. Align floor and ceiling tracks; locate to wall and partition layout. Secure in place as indicated on approved engineered shop drawings, at maximum 24 inches on center.
- C. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom tracks. Space studs as indicated on approved shop drawings; not more than 2 inches from abutting walls and at each side of openings.
- D. Construct corners using minimum three studs. Double stud wall openings, door and window jambs.
- E. Erect load bearing studs one piece full length. Splicing of studs is not permitted.
- F. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- G. Install intermediate studs above and below openings to align with wall stud spacing.
- H. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing. Install double deep leg deflection track or specified clip system for vertical deflection of primary building structure.
- I. Attach cross studs, furring channels to studs for attachment of fixtures anchored to walls.
- J. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- K. Touch-up field welds and damaged galvanized and primed surfaces with primer.

3.4 ERECTION (WIND LOAD ONLY)

- A. Handling and lifting of prefabricated panels shall be done in a manner as to not cause distortion in any member.
- B. Tracks shall be securely anchored to the supporting structure as shown on the plans.
- C. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element or they shall be butt-welded spliced together.
- D. Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.
- E. Jack studs or cripples shall be installed below window sills, above window and door heads, at first standing stair rails, and elsewhere to furnish support and shall be securely attached to supporting members.
- F. Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to the following schedule. Wall up to 10 foot height; one row at mid-height. Wall exceeding 10 feet in height; bridging rows spaced not to exceed 5 feet on-center.

3.5 ERECTION (AXIAL LOAD-BEARING)

- A. Handling and lifting of prefabricated frame panels shall be done in a manner as to not cause distortion in any members.
- B. Tracks shall be securely anchored to the supporting structure as shown on the plans, and as designed and detailed on approved shop drawings.
- C. Complete uniform and level bearing support shall be provided for the bottom track.
- D. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element or they shall be butt welded or spliced together,
- E. Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.
- F. Framed wall openings shall include headers and supporting studs as shown on the plans, and as designed and detailed on approved shop drawings.
- G. Jack studs shall be installed below window sills, above window and door heads, at free standing stair rails and elsewhere to furnish support and shall be securely attached to supporting members.
- H. Temporary bracing shall be provided until erection is completed.
- I. Wall stud bridging shall be installed in a manner to provide resistance to both minor axis bending and rotation. Bridging rows shall be equally spaced not to exceed 4 feet on-center.
- J. Provide stud walls at locations indicated on plans as "sheer walls" for frame stability and lateral load resistance. Such stud walls shall be braced as indicated on plans and specifications.
- K. Splices in axially loaded studs are not be permitted.
- L. Provide insulation equal to that specified elsewhere in all doubled jamb studs and double header member which will not be accessible to the insulation contractor.

3.6 TOLERANCES

- A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Documents and shall not be added to allowable tolerances indicated for other work.
 - 1. Allowable variation from true plumb, Level, and Line: 1/8 inch in 20 feet.
 - 2. Allowable variation from true wall thickness: 1/8 inch in 20 feet.
 - 3. Allowable variation from true plane of adjacent surfaces: 1/8 inch in 10 feet.

End of Section

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SECTION 05 41 00

STEEL STUD SHEAR CONNECTORS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment, and services, as required, to furnish and install all steel stud shear connectors, as shown on the Drawings.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of all the General and Subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that a Contractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated contractors of their responsibilities regardless of what alternate(s) are selected at no extra cost will be charged to the Owner. Refer to Section 01 23 00, ALTERNATES for the list and description of Alternates.
- C. Items To Be Installed Only: Not Applicable.
- D. Items To Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
 - 1. Section 01 45 00, QUALITY CONTROL
 - 2. Section 01 45 29, TESTING LABORATORY SERVICES
 - 3. Section 01 45 90, PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS.
 - 4. Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS.
 - 5. Section 03 30 00, CAST-IN-PLACE-CONCRETE.
 - 6. Section 05 12 00, STRUCTURAL STEEL
 - 7. Section, 05 31 00, STEEL DECK.

1.03 SUBMITTALS

- A. Submit complete layout shop drawings drawn no smaller than 1/8" = 1'-0". All special conditions shall be indicated. Size and length of studs shall be indicated, as well as welding information and layout of all studs. Shop drawings will not be reviewed without all the above information clearly indicated. Shop drawings for the studs shall be coordinated with the deck drawings required in Section 05 31 00, STEEL DECK.
- B. Manufacturer's catalogue shall be submitted with the shop drawings.

- C. Electronic Submittals: Refer to Section 01 33 00 for Submittal Procedure. In addition, provide Engineer (1) fullsize paper print of each shop drawing, in addition to the electronic submittal. Paper copy will be retained by the Engineer and electronic copy will be returned. Review cycle will not commence until paper copy of shop drawing has been received.

1.04 CODES AND STANDARDS

- A. Except as modified by the requirements of other governing codes and by this specification, conform to the provisions and recommendations of the following codes and standards:
1. Manual of Steel Construction by the American Institute of Steel Construction, latest edition.
 2. Requirements of the American Welding Society for Arc and Gas Welding in Building Construction.

1.05 TESTING, INSPECTION, AND QUALITY CONTROL

- A. A program of inspection and testing of stud shear connector work will be established by the Structural Engineer of Record (SER), who will direct the implementation of tests as carried out by and independent testing agency. All costs for inspection and testing shall be borne by the Owner.

1.06 LEED Submittals- Refer to Section 01 81 13 "Sustainable Design Requirements."

- A. Project materials cost data: Provide statement indicating total cost for materials used for the Project.
- B. Sourcing of Raw Materials: Provide submittals indicating how the following requirements will be met (MRc3):
1. List of proposed materials with recycled content: Manufacturers' certification of recycled content indicating percentage by weight of both pre-consumer and post-consumer recycled content. Include statement of costs.
 2. Submit required information using the LEED Data form for the following LEED items:
 - a. Local/Regional Materials:
 - 1) Sourcing location(s): Indicate location of extraction, harvesting and recovery of raw materials used in the products' manufacturing; indicate the distance between extraction, harvesting and recovery and the project site. Indicate percentage of product content from qualified locations.
 - 2) Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All steel is to consist of a minimum of 95% recycled steel with over 80% post-consumer and 15% pre-consumer recycled content in compliance with LEED requirements.

- B. The stud shear connectors shall be made of cold finished carbon steel bars conforming to ASTM A 108 requirements. The steel shall have a minimum tensile strength of 60,000 p.s.i. The studs shall be three-quarter in. (3/4") diameter, and shall also conform to the requirements of Articles 429 and 430, "Code for Welding in Building Construction" AWS D1.0069 of the American Welding Society. If flux retaining caps are used, the steel for the caps shall be of a low carbon trade suitable for welding complying with ASTM A 109 requirements.

PART 3 EXECUTION

3.01 QUALITY CONTROL

- A. Before beginning work, inspect all conditions to receive work and notify the Architect/SER in writing of any condition that might prevent a satisfactory installation.
- B. The starting of work of this Section will be construed as acceptance of the conditions to which this work is to be applied.
- C. A minimum of two (2) studs shall be welded at the start of each production period in order to determine proper generator, control unit, and stud welder settings. These studs shall then be bent 45 degrees from vertical, without weld failure, to test installation procedures.
- D. If, after welding, visual inspection reveals that a sound weld or full 360 degree fillet weld has not been obtained for a particular stud, the stud shall be hammered bent approximately 15 degrees off perpendicular to the nearest end of the beam or bent away from the opening of the fillet.
- E. Three (3) working days notice shall be given to the Owner when materials are to be inspected.
- F. Studs meeting this test will be considered acceptable and shall be left in the bent position. Studs failing this test shall be replaced.
- G. When the temperature is below 32 degrees Fahrenheit, one (1) stud in each 100 shall be tested after cooling. Studs shall not be welded when the temperature is below 0 degrees Fahrenheit or when the surface is wet.

3.02 ERECTION

- A. The surface of the beam flange that will receive the centering and the stud shear connectors shall be free of mill scale, heavy rust, dirt debris, snow, ice, water, or any other material that would adversely affect stud welding. Any water in the valleys of the decking shall be released or blown out.
- B. It shall be noted that the studs may be used to attach the metal decking specified in Section 05 31 00, STEEL DECK.
- C. The metal decking shall be held in intimate contact with itself at laps and with the supporting steel when the studs are installed.

END OF SECTION

Section 05 50 00
METAL FABRICATIONS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 05 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract: As provided under Section 05 00 01 – MISCELLANEOUS AND ORNAMENTAL IRON Trade Contract REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 05 00 01.

1.2 SUMMARY

- A. The work of this Section consists of miscellaneous metals, and ornamental iron where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install:
1. Steel stairs and ramps with intermediate landing construction, complete with all supporting members, guards and handrails.
 2. Interior, stainless steel handrails, brackets and guardrails and associated mesh/sheet metal.
 3. Metal flooring, handrails, guardrails and mesh, at catwalks, tormentor bars, platforms and loading lofts at Auditorium.
 4. Miscellaneous framing and supports for the following:
 - a. Penetration framing.
 - b. Platforms for equipment.
 - c. Projection screens.
 - d. Ceiling mounted projectors.
 - e. Auditorium acoustical components.
 - f. Therapeutic swing in OT/PT B071 and B076.
 - g. Wall reinforcement posts at Locker Rooms and other areas.
 - h. Overhead doors and grilles.
 - i. Vehicle exhaust system.
 - j. Folding glass panel door system.
 - k. Accordion folding fire doors.
 - l. Lightning protection masts.
 - m. Suspended steel experiment frame at Science Rooms.
 - n. Suspended steel grid system at Art Rooms.
 - o. Coiling grille at B171 Security Office.
 - p. Steel framing support members for display monitors in Servery

5. Counter and bench supports.
6. Galvanized steel plate wall closure jambs and head assembly.
7. Walk-through fixed ladder with cage and ladders at Auditorium catwalks, gallery, and loading lofts.
8. Ships ladder at Auditorium catwalk, gallery, and loading lofts.
9. Pipes for lighting fixtures and face of Control Booth B272.
10. Vertical poles at Auditorium side walls.
11. Rooftop condenser unit galvanized platform grating.
12. Downspout boots.
13. Rooftop equipment screen supports.
14. Miscellaneous support assemblies at masonry firewall, and other locations indicated on the Drawings.
15. Shelf and relieving angles.
16. Loose bearing and leveling plates, unless otherwise noted on Drawings or herein.
17. Bent steel pipe stage light support and supporting ceiling brackets.
18. Folding panel partition and overhead door support beams, channels, plates and angles.
19. All other non-specified work generally performed by the miscellaneous metals trade, and which are not otherwise provided under Section 05 12 00 - STRUCTURAL STEEL FRAMING and Section 05 40 00 - COLD-FORMED METAL FRAMING.
20. Hot-dipped galvanized steel lintel/clip assemblies and fasteners at exterior wall openings where indicated on Drawings and NOT included as part of Section 05 12 00 – STRUCTURAL STEEL.
21. Galvanized and shop primed pipe bollards
22. Custom fabricated exterior seating brackets, sleepers and supports
23. Exterior, shop primed and finished handrails, posts, brackets, steel mesh infill panels and guardrails at landscape walls, ramps and stairs (as indicated on Drawings).
24. Lateral restraints for interior masonry partitions.
25. Clip angles for CMU shear walls to structural steel.
26. Galvanized steel angle at loading dock slab edge and overhang.
27. Decorative metal risers at stairs receiving terrazzo treads.
28. Stainless steel cladding at Lobby Stairs/Ramp.
29. Auto/Diesel mezzanine guardrail and gate.
30. Auto/Diesel welding system support beam.
31. FRP grating and frames at acid neutralization pit(s).
32. Universal grid supports including pipe clamps and other miscellaneous components and fasteners.
 - a. Universal grid plate connectors.
 - b. Black iron pipe.

- C. Furnish the following items for installation under related sections:
 - 1. Galvanized and shop primed pipe bollards, steel vehicle gates and bollards, steel scoreboard supports and wide flange steel bleacher supports as indicated on Drawings installed under Division 32 – SITE IMPROVEMENTS. Concrete fill for bollards provided by Section 03 30 00 – CAST-IN-PLACE CONCRETE.
 - 2. Anchors, bolts, inserts, and sleeves, required to attach miscellaneous metals for embedment into concrete under Section 03 30 00 - CAST-IN-PLACE CONCRETE.
 - 3. Loose cold rolled steel lintels at door, window, ductwork and similar openings in interior masonry partitions; installed under Section 04 20 00 - UNIT MASONRY.
 - 4. Hot dipped galvanized and epoxy primed loose lintels at door, louver, window and similar openings in exterior masonry partitions; installed under Section 04 20 00 - UNIT MASONRY.
 - 5. Anchor bolts, with nuts and washers; inserts; and sleeves; required to attach miscellaneous metal items to masonry, for installation under Section 04 20 00 - UNIT MASONRY.
 - 6. Continuous frame mounting angles; installed under Section 08 90 00 - LOUVERS AND VENTS.
- D. Install the following items furnished under related sections:
 - 1. Volleyball sleeves furnished under Section 11 63 23 – GYMNASIUM EQUIPMENT.
- E. Perform all drilling and cutting in miscellaneous metal items required for the attachment of other items.
- F. Core drill concrete stairs; grout into place railing posts.
- G. Perform all shop-painting for all surfaces of exposed to view galvanized and non-galvanized metals, and post-erection touch-up of shop prime coat, using the same material as shop-prime coating.
- H. Perform application of liquid zinc touch-up to all welds of galvanized steel items furnished hereunder.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to ADVERTISEMENT FOR BIDS for time and date.

- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.4 RELATED REQUIREMENTS

- A. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- B. Section 01 43 39 - MOCK-UPS: Requirements for freestanding exterior mock-up assembly requiring work of this Section.
- C. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- D. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- E. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Installation of anchors into concrete, pouring concrete stair treads and landings.
- F. Section 04 20 00 - UNIT MASONRY: Building in of anchors into masonry walls.
- G. Section 05 12 00 - STRUCTURAL STEEL: Structural steel framing members not otherwise specified hereunder.
- H. Section 05 31 00 - STEEL DECKING: Metal roof deck and floor decking.
- I. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural stud framing.
- J. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.
- K. Section 06 20 14 EXTERIOR WOOD SEATING: Wood tops at exterior benches
- L. Section 06 40 00 - ARCHITECTURAL WOODWORK: Plastic Laminate counters requiring fabricated steel supports.
- M. Section 08 33 23 - OVERHEAD COILING DOORS: Steel framing for coiling doors.
- N. Section 08 33 26 – OVERHEAD COILING GRILLES
- O. Section 08 35 15 – PANEL FOLDING DOORS
- P. Section 08 35 23 – ACCORDION FOLDING FIRE DOORS

- Q. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-load-bearing metal framing systems for plaster construction.
- R. Section 09 91 00 - PAINTING: Applied finish coatings other than those specified herein.
- S. Section 10 22 28 – FOLDING PANEL PARTITIONS: Overhead attachment brackets.
- T. Section 11 40 00 - FOODSERVICE EQUIPMENT: Stainless steel hoods, through-wall tray and food service equipment.
- U. Section 11 61 43 - STAGE CURTAINS: manually operated curtains with related valances, rigging, counterweights, frames and cables.
- V. Section 11 66 53 - GYMNASIUM DIVIDERS: Gymnasium dividers including all supporting channels and suspension rods.
- W. Section 14 24 24 - HOLELESS HYDRAULIC ELEVATORS: Elevator guide rails and sill support angles.

1.5 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM A 36 - Structural Steel.
 - 2. ASTM A 53 – Pipe, Steel, Black and Hot-Dipped, Zinc-coated, Welded and Seamless Steel Pipe.
 - 3. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
 - 4. ASTM A 123 - Zinc Coatings on Products Fabricated From Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip.
 - 5. ASTM A 153 - Zinc-Coating on Iron and Steel Hardware.
 - 6. ASTM A 167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 7. ASTM A 276 –Stainless and Heat- Resisting Steel Bars and Shapes.
 - 8. ASTM A 283 - Carbon Steel Plates, Shapes, and Bars.
 - 9. ASTM A 307 - Carbon Steel Externally Threaded Standard Fasteners.
 - 10. ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - 11. ASTM A312/A312M - Seamless and Welded Austenitic Stainless Steel Pipes
 - 12. ASTM A 361 - Zinc Coated (Galvanized) Iron or Steel Roofing sheets.
 - 13. ASTM A 385 – Providing High Quality Zinc Coatings.
 - 14. ASTM A 386 - Zinc Coating on Assembled Steel Products.
 - 15. ASTM A 446 - Zinc Coated (Galvanized) Steel Sheets of Structural Quality, Coils and Cut Lengths.

16. ASTM A 480 – General requirements Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
17. ASTM A 500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
18. ASTM A 501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
19. ASTM A 525 - Specification for Sheet Steel, Zinc Coated (Galvanized).
20. ASTM A 666 - Stainless and Heat Resisting Chromium-Nickel Steel Sheet Strip, Plate and Flat Bar for Structural and Architectural Applications.
21. ASTM A 780 – Repair of Hot-Dip Galvanizing.
22. ASTM A1011/A1011M - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
23. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus.
24. ASTM B 209 - Specification for Aluminum Alloy, Sheet and Plate.
25. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
26. ASTM A 575 Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
27. ASTM A576 Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
28. ASTM F 593 - Stainless Steel Bolts, Hex Cap Screws.
29. ASTM F 594 - Stainless Steel Nuts.
30. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
31. AGAI - Inspection Manual for Hot-Dipped Galvanized Products.
32. AISC - Code of Standard Practice for Steel Buildings and Bridges.
33. AISC - Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
34. AISI. referenced standards.
35. AWS - Standard Code for Arc and Gas Welding in Building Construction.
36. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.
37. MIL-P-21035B - Paint High Zinc Dust Content, Galvanizing Repair (Metric) (superseding DOD-P-21035A)
38. NAAMM, applicable publications.
39. SSPC referenced standards.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

2. Be responsible for establishing locations and levels for all work of this Section, except such parts as may be delivered to others and set by them. In such cases assist them in properly locating said parts.
 3. Coordinate loading requirements of stage curtains and locations of supports directly with Section 11 61 43 - STAGE CURTAINS.
- B. Pre-installation conference:
1. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.
- C. Sequencing:
1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
 2. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.
 3. Field Measurements
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
 4. Clip angles for concrete masonry unit walls and partitions shall be installed prior to application of fireproofing.
- D. Scheduling:
1. Coordinate the work of this Section with the respective trades responsible for installing inserts and anchorages furnished by this Section; make arrangements for delivery, receipt and installation of inserts and anchorages to prevent delay of the Work.

1.7 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Product Data: Manufacturer's complete product data and specifications for all prefabricated items, shop primer paints, liquid zinc coating, and hydraulic cements, to be furnished hereunder.
 - a. For epoxy anchoring systems: Furnish ICC-ES Code approvals and performance data that includes recommended loading for each application.
 2. Shop Drawings, bearing registration stamp of a Professional Structural Engineer registered in Commonwealth of Massachusetts.
 - a. General requirements:
 - 1) Include large scale details of items of all metal fabrications to be furnished hereunder, showing proposed methods of anchorage to surrounding structure and conditions.

- 2) Indicate on the shop drawings all erection marks for various places of miscellaneous metals, and ensure that the actual field pieces bear corresponding marks.
 - 3) Indicate shop built components, and field-built components.
 - 4) Indicate and detail all field installation connections.
 - 5) Indicate weld types and length.
 - 6) Indicate blocking locations.
 - b. Include large scale details of stairs, intermediate landings and railings.
 - c. Include large scale details of metal fabrications supporting work of other trades.
3. Selection Samples:
 - a. Sample card indicating Manufacturer's full range of colors of shop applied finishes available for selection by Architect.
4. Verification Samples:
 - a. Factory/shop finishes: 3 inch by 6 inch samples of factory-applied coatings and colors proposed for use for approval prior to coating application.
 - b. Handrail, quality assurance sample: Fabricate a sample showing a typical handrail section demonstrating component connections. Sample section shall be minimum 18 inches in horizontal length and 12 inches in height and include a corner post. Provide a shop primed finish.
 - 1) Accepted sample will be used to establish the quality standard for railing fabrication and workmanship.
5. Certificates:
 - a. Certificate of Compliance from Galvanizer: Submit notarized Certificate of Compliance with application for payment for galvanizing, signed by galvanizer, indicating compliance with requirements of specifications. Include scope of services provided, and quantity and itemized description of items processed.
 - b. Welders certificates as specified under Article entitled "QUALITY ASSURANCE".
6. Delegated Design Submittals:
 - a. Provide calculations for loading and stresses for metal stairs, landings and all railings (handrails and guardrails) bearing the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements as required by the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments have been satisfied.
 - b. Work scope requiring loading and stress calculations includes, but is not limited to the following:
 - 1) Stairs, intermediate landings and railings.
 - 2) Metal fabrications supporting work of other trades.
 - 3) Access ladders and rooftop ladders.
 - 4) Seismic restraints.
 - 5) Ledge and shelf angles.
 - 6) Overhead and vertical supports using universal grid system.

- B. LEED Submittal Requirements:
1. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 2. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 3. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 4. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 5. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- C. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Special Inspections: Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, the following:
 - a. All certifications, reports and programs required by the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments for work engineered by Trade Contractor's Professional Engineer under the requirements of this Section.

1.8 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
1. Galvanizer's tagging: The galvanizer shall mark all lots of material with a clearly visible stamp or tag indicating the name of the galvanizer, the weight of the zinc coating, and the applicable ASTM Specification Numbers.
- B. Qualifications:
1. Welders: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
 2. Licensed Professionals: Provide the services of a Professional Structural Engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and as required by the 2015

International Building Code with Massachusetts Building Code, Ninth Edition amendments.

- a. Prepare Shop Drawings for stairs, railings, and handrail brackets under direct supervision of a same Engineer experienced in design of this work.

1.9 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.

B. Storage and Handling Requirements:

1. Handle and store materials under cover in a manner to prevent defacement, deformation, or other damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter on the metal work. All such work shall be repaired and cleaned prior to erection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: All materials shall be new stock, free from defects impairing strength, durability or appearance, and of best commercial quality for each intended purpose. Unless specifically called for otherwise, work shall be fabricated from the following:
 1. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for the type of use and finish indicated
 - a. Extruded bar and shapes: ASTM B 221, alloy 6063--T6 or alloy 6463-T52.
 - b. Extruded pipe and tube: ASTM B 429, alloy 6063-T6.
 - c. Drawn Seamless tube: ASTM B 483, alloy 6063-T832.
 - d. Plate and sheet: ASTM B209, alloy 6063--T6 or Alloy 3003-H14
 2. Steel shapes, plates and bars: ASTM Designation A 36.
 3. Steel pipe: ASTM A53, grade A, seamless pipe, black finish unless otherwise noted.
 4. Stainless steel pipe: ASTM A312/A312M, Grade TP304.
 5. Structural steel tubing, square and rectangular shapes: ASTM A500, Grade B.
 6. Stainless steel tubing: ASTM A554, Grade MT304.
 7. Steel tubular shapes: ASTM A 501.
 8. Steel plates to be bent or cold-formed: ASTM A283, grade C.
 9. Steel bars and bar-size shapes: ASTM A36.
 10. Cold-finished steel bars: ASTM A108.
 11. Galvanized carbon steel sheets: ASTM A526, with G90 zinc coating in accordance with ASTM A525.
 12. Stainless steel plate and sheet: ASTM A666, Type 304.

13. Stainless steel castings: ASTM A743, Grade CF 8 or CF 20.
- B. Recycled content of Ferrous Metals: Use maximum available percentage of recycled steel. Steel incorporated into the work shall contain not less than 25 percent of recycled steel.
- C. Steel materials: to be hot dip-galvanized: Provide steel chemically suitable for metal coatings complying with the following requirements: Carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.
- D. Metal surfaces, general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
- E. Welding rods: AWS E70XX grade, or select in accordance with AWS specifications for the metal alloy to be welded and in accordance with the recommendation of the welding rod manufacturer.
1. Where stainless steel is welded to mild steel, select rods to minimize dilution effects on the stainless steel component.
- F. Abrasive Surface Floor Plate at Catwalks: Galvanized steel plate with non-slip surface finish.
1. Type: Anti-slip, non-gritted, steel surface on steel substrate.
 2. Thickness: 3/8 inch.
 3. Finish: Painted
 4. Surface Texture: Grade 2, Medium.
 5. Surface: All metal plasma stream deposition process bonds surface to substrate. Anti-slip primarily martensitic steel surface consisting of a random hatch matrix. Add to all surface coverage.
 6. Surface Hardness, Rockwell C Scale, ASTM E 140 and E 384: Minimum of 55.
 7. Bond Strength, Surface to Substrate, ASTM C 633: Minimum of 4,000 psi.
 8. Coefficient of Friction, Anti-Slip Surface: Minimum of 0.6.
 9. UL Listed: UL 410 slip resistant.
 10. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Slipnot Metal Safety Flooring, Division of W.S. Molnar Company, Detroit, MI, product "Grip Plate".
 11. Acceptable Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include the following or approved equal:
 - a. Slipnot Metal Safety Flooring, Division of W.S. Molnar Company, Detroit, MI, product "Grip Plate".
 - b. Ross Technology Corporation, Leola, PA, product "Algrip".

- c. Harsco Industrial IKG, Channelview, TX, product "Mebac".

2.2 UNIVERSAL GRID SYSTEM

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Unistrut Corporation, Itasca IL.
 - 1. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following.
 - a. Unistrut Corporation, Itasca IL., product "Unistrut"
 - b. Cooper US, Inc., Houston TX., product "Cooper B-Line".
 - c. Gleason Partners, LLC., Grand Rapids, MI., product "Strut Channel Systems".
 - d. Thomas & Betts Corporation, Memphis TN, product "Kindorf Superstrut".
 - 2. There are no other manufacturers of this product type available in the United States, fabricators may choose to fabricate grid system components using structural steel shapes, with submittal and approval of complete engineering Drawings and calculations as a substitution.
 - 3. Finish:
 - a. Zinc coated after all manufacturing operations are complete. Coating shall conform ASTM A 123 or A 153.
- B. All channel members shall be a minimum 1-5/8 inch square and fabricated from structural grade steel confirming to the following ASTM specifications:
 - 1. ASTM A 653 Grade A
- C. All fittings shall be fabricated from steel conforming to one of the following ASTM specifications:
 - 1. ASTM A 36, A 575, or A 576.
 - 2. Provide all fasteners, clamps, plate connectors and miscellaneous components required for a complete installation
- D. All materials shall be stamped and identifiable by manufacturer and part number (where appropriate). Materials that appear damaged, distressed, unidentifiable or rusted shall not be used and will not be accepted.

2.3 FASTENERS

- A. General: Provide all fasteners and attachments as required for work specified herein and as indicated on the Drawings.
 - 1. In general,
 - a. Provide all fasteners and attachments of the same material and finish as the metal to which it is applied unless otherwise noted.
 - 1) Provide Type 304 stainless-steel fasteners for exterior use.
 - 2) Provide Type 304 stainless-steel fasteners for fastening aluminum.
- B. Steel Bolts, Nuts and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.

- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel type 304 bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Bolts: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1

2.4 ACCESSORIES

- A. Adhesive for attaching anchors and for direct pinning: high-modulus, high strength, moisture tolerant, epoxy adhesive, two-component 100 percent solids, epoxy resin complying with ASTM C 881.
 - 1. Minimum performance properties (as cured at 70 degrees F. and 50 percent relative humidity):
 - a. Minimum Compressive Strength, tested per ASTM D-695:
 - 1) at 3 days: 11300 psi (31.0 MPa).
 - 2) at 7 days: 11800 psi (44.8 MPa).
 - 3) at 28 days: 12200 psi (58.6 MPa).
 - b. Shear Strength, tested per ASTM D-732 at 14 days: 6200 psi (43 MPa)
 - c. Minimum Flexural Strength tested per ASTM D-790 at 14 days: 10700 psi (74 MPa).
 - d. Minimum Bond Strength tested per ASTM C-882 at 14 days:
 - 1) Plastic Concrete to Hardened Concrete 2200 psi (13.8 Mpa).
 - 2) Plastic Concrete to Steel 2000 psi (13.8Mpa).
 - e. Maximum Water Absorption, tested per ASTM D-570: 24 hour 0.27%
 - f. Minimum Tensile properties tested per ASTM D-638: Tensile Strength 6900 psi (48 Mpa).
 - 2. Products which may be considered as equal include the following, or approved equal:
 - a. Sika Corporation, Lyndhurst NJ, product: "Sikadur 32 Hi-Mod Gel.
 - b. Simpson Strong Tie, Pleasanton, CA, product "SET High Strength Epoxy".
 - c. Symons Corporation, Des Plaines, IL, product "Rescon Gel anchor 304".

- B. Grout: Ready mixed, non-metallic high-strength controlled expansion grout of flowable consistency, conforming to ASTM C 1107 with minimum compressive strength of 6,500 pounds per square inch (44.8 MPa) at 28 days.
1. Products which may be considered as equal include the following, or approved equal:
 - a. Conproco, Hookset NH, product: "Conpro-set".
 - b. Five Star Products, Inc., Fairfield CT, product "Five Star Grout."
 - c. L&M Construction Chemicals, Omaha NE, Product: "Crystex."
 - d. Master Builders, Cleveland, OH., product "Masterflow 713".
 - e. Sika Corporation, Lyndhurst, NJ., product "SikaGrout 212".
 - f. Sonneborn Building Products, Minneapolis, MN., product "Sonogrout 10K".
 - g. Symons Corporation, DesPlaines, IL., product "Symons Multi Purpose Grout".
- C. Metal paste filler: 2 component epoxy, high strength, structural adhesive putty:
1. Products which may be considered as equal include the following, or approved equal:
 - a. Abatron, Inc. Gilberts IL, product: "Ferrobond-P".
 - b. Dynatron/Bondo Corp., Atlanta, GA, product: "Bondo Plastic Filler".
 - c. U.S. Chemical & Plastics Company., Massillon OH, product "Metal filled epoxy".
- D. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.
1. VOC limit: not more than 250 g/L.
 2. Specified manufacturer and product: ZRC Worldwide, Marshfield MA, product "ZRC-221".
- E. Primer for non-galvanized steel surfaces, modified alkyd rust-inhibitive, high solids primer:
1. Products which may be considered as equal include the following, or approved equal:
 - a. International (Courtaulds Coatings): Interlac 260HS.
 - b. Rust-Oleum: 1069 Heavy Duty Rust Inhibitive Red Primer.
 - c. Sherwin Williams: Kem Flash Primer HS, Red Oxide E61R702.
 - d. Tnemec: 10-99 Red Primer.
 - e. Wibur & Williams (California Products Corporation): 1703 Universal Metal Primer.

2.5 FABRICATION - GENERAL

- A. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting; well formed and finished to shape and size, true to details with straight, sharp lines, and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.
- B. Shop fabricate items wherever practicable, accurately fitting all parts and making all joints tight. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- C. Do all cutting, punching, drilling, and tapping required for attachment of anchor bolts and other hardware and for attachment of work by other trades. All such work shall be done prior to hot-dip galvanizing of the various components.
- D. Grind all edges of bars and plates completely free from nicks and machine marks, prior to galvanizing and/or shop priming.
- E. Weld all permanent connections, make all welds in a continuous manner; tack-weld only where specifically indicated on the Drawings. Grind all exposed-to-view welds completely smooth and flush to the surface plane of the base metals. Perform welding work prior to galvanizing in all cases, except where field welding is necessary, in which case, completely coat all such welds with two coats of specified liquid zinc coating, after performing grinding operations.
- F. Use screws and bolts only where welding cannot be performed, of sufficient size to ensure against loosening from normal usage of miscellaneous metal items furnished hereunder.
 - 1. Countersink all screw heads and bolt heads as far as practicable. Use not less than two screw, bolts, or other anchorage items, at each connection point.
 - 2. Draw up all threaded connections tightly, after buttering same with pipe joint compound, to exclude water.
- G. Carefully coordinate the installation of metal fabrications with the work of trades responsible for the installation of interfacing work, and for the installation of work into the various assemblies furnished hereunder, and permit the installation of the related materials to be made at the appropriate times.
- H. Fit and assemble metal fabrications in largest practical sections for delivery to site, ready for installation.
 - 1. Galvanized assemblies: Where size of assembly is too large for galvanizing kettle, galvanize components prior to fabrication and assemble after galvanizing.

2.6 FABRICATION - STAINLESS STEEL FABRICATIONS

- A. Weld and form edges, ends, and joints, by electric process, with all welded joints ground and polished smooth. Perform all welding so that no mark of any kind shall be noticed on the finished surfaces. Welds and adjoining components shall be homogenous, non-porous, free from pits, cracks, imperfections or discoloration.
 - 1. Hammer and peen flush with adjoining surface wherever materials have been depressed or sunken by a welding operation, and, if necessary re-weld and grind to eliminate low spots.

2. Excessive distortions caused by welding will not be acceptable and shall be cause for rejection and removal from Project Site.
- B. Exercise care in grinding operations to avoid excessive heating of metal and discoloration. Use iron-free abrasives, wheels and belts on stainless steel; do not use the same abrasives, wheels or belts for both steel and stainless steel. Provide a uniform and smooth final polishing with a uni-direction grain for total length of materials. Cross grains and random polishing will not be acceptable and shall be cause for rejection.
 - C. Provide a finish consistent throughout the work of this Section.
 1. Brake ends free of open texture or orange peel appearance. Where brake work mars the finish of the materials, remove marks by grinding, polishing and finishing.
 2. Shear edges free of burrs, projection or fins to eliminate all danger of laceration.
 3. Neatly finish mitre joints and bullnosed corners with under edge of the material neatly ground to a uniform condition and in no case will overlapping materials be acceptable.
 - D. General exposed to view finish: Number 4, brushed finish unless otherwise indicated.

2.7 FABRICATION - STAIRS AND RAILINGS

- A. Refer to the Drawings for location and details of steel stairs and railings (handrails and guardrails) to be furnished and installed hereunder.
 1. Verify heights shown in Drawings comply with referenced codes and regulations.
- B. Stair and railing performance requirements; conform to all requirements of those codes and regulations referenced under Section 01 41 00 - REGULATORY REQUIREMENTS.
 1. Stairs: Design, fabricate and install stairs to safely support a minimum live load of 100 pounds per square foot and a concentrated load of 300 pounds on any area of four square inches as required under the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments.
 - a. Stair framing vertical deflection limit: $L/480$.
 2. Railings: Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads as follows and as required under the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments.
 - a. Resist a load of 50 pounds per linear foot (0.73 kN/m) applied in any direction at the top and to transfer load through railing supports to structure.
 - b. Resist a single concentrated load of 200 pounds (0.89kN) applied in any direction at any point along the top, and to transfer load through railing supports to structure. Concentrated loading requirements are not concurrent with other loading requirements.

- c. Intermediate rails, balusters and panel fillers shall resist a horizontally applied load of 50 pounds (0.89 kN) on an area equal to 1 square foot (0.093m²), including openings and space between rails. Reactions due to this loading are not required to be superimposed with loadings specified for top rail.
- C. Sizes of all headers, stringers, and other structural members; and gauges and configurations of all riser tread and landing plates and pans, railings, stringers, and posts shall be as indicated on the approved shop drawings, and in accordance with the standards of the National Association of Architectural Metal Manufacturers.

2.8 FABRICATION - SUPPORTS

- A. Design, engineer and fabricate structural overhead support for equipment, furnishings, and products furnished under Sections, which includes, but is not limited to:
 - 1. Folding panel partitions.
 - 2. Equipment furnished under individual specification sections.
 - 3. Above ceiling support for cubicle curtain track and similar products furnished under other sections.
- B. Fabricate support system to carry the entire load of supported products to building structure above without transferring any horizontal or vertical load to ceiling system(s). Provide frequently spaced holes for multiple adjustment. Provide diagonal bracing. Use of a "Universal Grid" system members is acceptable.

2.9 FINISHES - HOT-DIP GALVANIZING

- A. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.
- B. Hot-dip galvanizing: Provide coating for iron and steel fabrications applied by the hot-dip process "Deltagalv" by Duncan Galvanizing, or approved equal meeting all requirements of this specification. Comply with ASTM A 123 for fabricated products and ASTM A 153 for bolts, nuts, washers, and other rough hardware. Provide thickness of galvanizing specified in referenced standards.
 - 1. Wherever possible, perform galvanizing after assembly of items.
 - 2. Galvanized items shall be straightened to remove all warpage and distortion caused by the galvanization process.
 - 3. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.
 - 4. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, brite paint, or aluminum paints is not acceptable.

2.10 FINISHES - SHOP APPLIED COATINGS

- A. Schedule: Shop applied coatings as scheduled at end of Section and as indicated on Drawings.
- B. For non-galvanized steel surfaces:
 - 1. Surface preparation prior to priming: Thoroughly clean all steel of all loose mill scale by power wire brushing or sandblasting. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter by wire-brushing or scraping (power wire-brushing, if necessary). Grind smooth any sharp projections.
 - 2. Shop apply specified primers thoroughly and evenly on the surfaces and worked into the joints and other open areas on the surfaces. Surfaces inaccessible after assembly shall be given two coats. Dry film thickness of primer shall be not less than 2.4 mils per coat.
- C. For hot-dipped galvanized steel items scheduled for field applied painted finish:
 - 1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified above under the Article entitle "Hot Dip Galvanizing".
 - 2. Provide factory-applied polyamide epoxy primer, 2.0 mils dry film thickness minimum, "Primergalv" by Duncan Galvanizing or approved equal meeting all requirements of this specification. Apply primer within 12 hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations, and as recommended by coating manufacturer. Engage the services of a galvanizing facility which will assume single-source responsibility for galvanizing and primer coating.
 - 3. Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.
- D. For aluminum fabrications: Shop-applied standard electrostatically applied baked enamel coating complying with AAMA 603. Coating shall be applied to 1.5 to 2 mils dry film thickness in color selected from manufacturer's fully available range.

2.11 FABRICATION – BOLLARDS AND FRAMING SUPPORTS

- A. Concrete Filled Pipe Bollard Fabrication: Provide Schedule 80 steel pipe of length to extend from at least 3 ft. below grade, unless otherwise indicated.
- B. Miscellaneous Bearing and Leveling Plate Fabrication: Provide miscellaneous loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Fabricate units flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts as required.
 - 1. Cut, drill, and tap units to receive hardware, hangers and similar items.
 - 2. Coordinate loading and attachment requirements for miscellaneous framing and supports with manufacturers of items being supported.
- C. Miscellaneous Framing and Supports: Fabricate to adequately support live and dead loads with a safety factor of 5. Provide necessary anchors, inserts, and fasteners. Fabricate support system to carry entire load of work being supported to structure above. Do not transfer any loads to ceiling systems.
 - 1. Cut, drill, and tap units to receive hardware, hangers and similar items.

2. Coordinate loading and attachment requirements for miscellaneous framing and supports with manufacturers of items being supported.

2.12 FABRICATION – EXTERIOR HANDRAILS AND GUARDRAILS

- A. Vertical posts: 2-1/2 inch by 1 inch steel bar stock.
- B. Vertical posts at corners or direction change: 2-1/2 inch by 2-1/2 inch steel bar stock.
- C. Bottom rail: 2-1/2 inch by 1 inch bar stock.
- D. Top rail: 3 inch by 1 inch bar stock.
- E. Mesh: 2 inch by 2 inch x 0.187 inch gauge welded wire mesh with “U” channel frame.
- F. Railings: 2 inch diameter steel pipe with bent rod brackets.
- G. All materials to be galvanized.

PART 3 - EXECUTION

3.1 ERECTION - GENERAL

- A. General: Accurately set all work to established lines and elevations, and rigidly fasten in place with suitable attachments to the construction of the building. At the completion of the work, check all work, re-adjust as required, and leave in perfect condition. Grind all exposed to view welds smooth to the touch.
- B. Setting bearing and leveling plates:
 1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
 2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - a. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
 - b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
- C. Miscellaneous framing and supports: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and additional requirements indicated on Shop Drawings.
 1. Anchor supports for operable partitions, and similar products, securely to and rigidly braced to building structure.

3.2 FIELD WELDING

- A. Field weld components indicated on approved shop drawings in accordance with AWS D1.1.

- B. Immediately after welding, touch-up welds, burned areas and damaged surface coatings.
 - 1. Thoroughly remove all spatter by power wire-brushing (or if inaccessible, wire brushing) per SSPC, surface preparation specification SP2 or SP3. Allow surface to cool to ambient temperature. Clean surface with solvent wipe to remove oils, grease and dirt in accordance with SSPC surface preparation specification SP1.
 - 2. Apply one coat of liquid zinc to attain a minimum of 1.5 mils dry film thickness. Coating should extend at least two inches beyond either side of weldment to ensure complete coverage of welded area.
 - 3. Re-prime any surface damaged by welding operations to the satisfaction of the Architect and Construction Manager.

3.3 FIELD BOLTING

- A. Accurately drive all bolts into holes, protecting the bolt heads so as not to damage the thread during the driving. Ensure that bolt heads and nuts rest squarely against the metal. Where structural members have sloping flange faces, provide approved beveled washers at the bolted connections to afford square seating for bolt heads or nuts. Nick bolt threads for unfinished bolts to prevent the nuts from backing off.
- B. Use an approved calibrated manual or power torque wrench to obtain the proper torque and tension as recommended by the bolt manufacturer for all ASTM A 325 bolts.

3.4 INSTALLATION OF STAIRS

- A. Preparation:
 - 1. Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
 - 2. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
 - 3. Perform cutting, drilling, and fitting required for installing metal stairs.
- B. Stair Installation: Construct and install stairs in strict accordance with the details, the approved shop drawings, and requirements of all codes, laws, and ordinances bearing on the work. Additionally comply with manufacturer's instructions for prefabricated stair systems, as applicable. Set stair units accurately in location, alignment, and elevation, measured from established lines and levels and free from distortion or defects.
 - 1. Fit exposed connections accurately together to form hairline joints.
 - 2. Weld stair framing to steel structure or to cast-in-placed weld plates, unless otherwise indicated on Drawings.
 - 3. Weld connections that cannot be shop welded because of shipping size limitations.
 - a. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

4. General requirements for field welding: Comply with Article 3.2 herein above, and the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 5. Stair installation tolerances:
 - a. Maximum Variation from Plumb: 1/4 inch (6 mm) for full height of stair.
 - b. Maximum Variation from Level: 1/8 inch (3 mm) in 10 feet (3000 mm).
 - c. Maximum Angular Variation of the Tread from True Position: 3 degrees.
- C. Grouted baseplates (as applicable):
1. Clean cementitious bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
 2. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - a. Use nonmetallic, nonshrink grout, unless otherwise indicated.
 - b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
- D. Concrete-filled-metal-pan stairs: Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 - CAST-IN-PLACE CONCRETE.

3.5 INSTALLATION OF RAILINGS AND BARRIER GATES

- A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loading. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:
1. Anchor posts in concrete by means of pipe sleeves providing at least 1/2 inch clearance around entire perimeter of post, preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with nonmetallic, nonshrink grout, mixed and placed to comply with grout manufacturer's directions.
 - a. For setting into colored concrete; hold grout back 1/2 inch from finish surface and fill void with Portland cement grout matching color and texture of adjacent surface.
 - b. Leave anchorage joint exposed, wipe off surplus grout, and leave 1/8" build-up, sloped away from post.
 2. Anchor posts to steel with steel flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.

3. Anchor rail ends into concrete and masonry with round steel flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.
 4. Anchor rail ends to steel with round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.
 5. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.
- B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2" clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure rails to walls with wall brackets, wall return fittings and anchor plates, in a manner required to meet code requirements, and as follows:
1. Each bracket shall be fastened with not less than 2 bolts.
 2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
 3. For hollow masonry anchorage, use toggle bolts having square heads.
 4. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors to steel reinforcing plate, using bolts of size and type required to support structural loads.

3.6 INSTALLATION - BOLLARDS AND FRAMING SUPPORTS

- A. Steel Pipe Bollards: Install steel pipe bollards as indicated on Drawings. Set bollards in concrete. Concrete shall be as specified in Section 03 30 00, CAST-IN-PLACE CONCRETE. Provide temporary bracing to accurately plumb bollards until concrete base has set. Fill pipe with concrete and form a smooth, rounded crown on top to shed water. See drawings for adjacent material and finishing of bollard foundation.
- B. Framing supports: Attach supports to cast-in-place concrete wall with epoxy anchors as noted on drawings. Set brackets at spacing noted on drawings level to accept wood seating.
- C. Miscellaneous Items: Carefully review Drawings for miscellaneous metal items required by various trades but not specifically listed above, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on Drawings, reasonably implied therefrom, or reasonably necessary for thorough completion of work

3.7 EXTERIOR STEEL HANDRAILS AND GUARDRAILS

- A. Fabricate and install exterior steel handrails and guardrails at stairs, ramps, landscape walls and other locations as called for on the Drawings.
- B. Handrails and guardrails throughout shall be of Architectural Quality. Exceptional care shall be taken in welding and grinding, filling and surface sanding to provide truly smooth, clean, neat and flush construction throughout, free of all surface defects and defacements.

1. Steel handrails shall be fabricated of solid steel bar stock, in accordance with designs and configurations as called for on the Drawings. Sizes and shapes of all members shall be as indicated. Joints shall be full-welded and ground flush and smooth.
 2. Steel guardrails shall be fabricated of solid steel bar stock and steel mesh, in accordance with designs and configurations as called for on the Drawings. Sizes and shapes of all members shall be as indicated. Joints shall be full-welded and ground flush and smooth.
- C. Include as part of this work all posts, handrails, intermediate rails, top rails, bottom rails, brackets, weld-on fittings, anchors, and other items required for complete installations.
 - D. Exterior handrails and guardrails shall be hot-dip galvanized after fabrication as specified hereinbefore.
 - E. Installation of Steel Handrails and Guardrails: Unless otherwise indicated on the Drawings, installation shall be embedded in concrete and filled with grout.
- 3.8 TOUCH-UP
- A. Touch-up all welds, burned areas, scratches, abrasions, on galvanized metals, using specified liquid zinc coating.
 - B. Touch-up all welds, scratches, abrasions, and other surface damaged on shop-primed or painted metals, using the same coatings as specified under shop applied finishes, herein above.
- 3.9 SCHEDULES
- A. General: Items listed hereinbelow provide further description of those already indicated in the Drawings. This list does not represent a complete list of miscellaneous metal components or types required to complete the Work.
 1. Carefully review all Drawings and furnish and install metal fabrications required by the various trades, whether or not specifically listed herein, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on the Drawings, reasonably implied therefrom, or reasonably necessary for the thorough completion of the work.
 - B. Steel pan stair shop primed and related support components, as detailed on the Drawings and specified herein above.
 - C. Lobby interior stairs and ramps railings, as detailed on the Drawings. Connections and sizing to conform to engineering and code requirements specified herein above.
 1. Stainless steel railing and brackets: Type 304 stainless steel with No. 4 satin finish.
 - a. Manufacturers:
 - 1) Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Julius Blum and Company, Inc. (Blum), Wood-Ridge, NJ as indicated below.

- 2) Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a) Julius Blum and Company, Inc., Wood-Ridge, NJ.
 - b) Blumcraft of Pittsburgh Division of C.R. Laurence Company, Inc., Pittsburgh, PA
 - c) Livers Bronze Company, Kansas City, MO.
 - d) The Wagner Companies, Butler WI.
 - b. Top rail: 2-1/2 inch outside diameter by 0.062 inch thick stainless steel ornamental grade tubing equal to Blum "Tubing" with factory mitered 90 degree elbows.
 - c. Handrails: Nominal 1-1/4 inch or 1-1/2 inch schedule 40 ornamental grade stainless steel pipe weighing 2.15 or 2.55 pounds per foot respectively end caps to match material and finish and splice or connector sleeves at joints equal to Blum "Handrail Pipe".
 - d. Wall mounted handrail brackets: Self-aligning stainless steel wall bracket, 2-1/4 inch long with 3 inch round escutcheon plate for concealed fastening to wall and shoulder to receive railing with two concealed fasteners equal to Blum "Carlstadt No. 242".
 - e. Bracket adapter: 1-1/2 inch pipe size with a 1/2 inch clear hole, stainless steel equal to Blum "No. 9361 Post Bracket Adapter".
 - f. Post mounted handrail brackets: Self-aligning stainless steel post bracket, 2-1/4 inch long with 5/8 inch wide by 1/2 inch diameter threaded stud to anchor to post and 3 inch wide shoulder to receive railing with two concealed fasteners equal to Blum "Carlstadt No. 222".
 - g. Center post handrail brackets: Self aligning stainless steel center mount post bracket, 2-1/2 inch long with 3/4 inch wide to receive railing with two concealed fasteners equal to Blum "Carlstadt No. 208".
 - h. Bar shapes: Stainless steel 1 inch by 1 inch inch equal to Blum "Square Bars" or 1 inch by 3/6 inch equal to Blum "True Bars".
2. Risers:
- a. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on McNichols Company, Tampa, FL.
 - b. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1) McNichols Company, Tampa, FL.
 - 2) C.I. Banker Wire + Iron Works, Mukwonago, WI.
 - 3) Belleville Wire Cloth Co., Inc., Cedar Grove, NJ.
 - 4) WireCrafters, LLC, Louisville, KY.
 - c. McNichols No. 18126111, stainless steel 11 gauge plate, 48 percent open area, with U edging and welded mitered corners and/or non-perforated borders as indicated on Drawings.
 - 1) Panel characteristics:
 - a) Material: Stainless steel.

- b) Size: As indicated.
 - c) Weight: 1.50 pounds per square foot.
 - d) Hole type: Round.
 - e) Hole pattern: 1/2 inch round on 11/16 inch staggered centers.
 - f) Hole arrangement: 60 degree staggered centers.
3. Mesh panels:
- a. Manufacturers:
 - 1) Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on McNichols Company, Tampa, FL.
 - 2) Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a) McNichols Company, Tampa, FL.
 - b) GKD Metal Fabrics, Cambridge, MD.
 - c) C.I. Banker Wire + Iron Works, Mukwonago, WI.
 - d) Belleville Wire Cloth Co., Inc., Cedar Grove, NJ.
 - e) WireCrafters, LLC, Louisville, KY.
 - b. Mesh: McNichols "Square Welded Wire Mesh" fabricated from 0.1875 inch diameter stainless steel wire in a 2 inch by 2 inch square pattern, with U edging fabricated 1 inch wide by 18 gauge thick stainless steel with welded mitered corners.
4. Stair cladding: 1/16 inch thick stainless steel sheet.
5. Stair treads: ¼ inch (6 gage) thick stainless steel plate.
- D. Typical interior railings, as detailed on the Drawings. Shop primed (except where stainless steel is indicated), connections and sizing to conform to engineering and code requirements specified herein above.
- 1. Stainless steel railing and brackets: Type 304 stainless steel with No. 5 satin finish.
 - a. Manufacturers:
 - 1) Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Julius Blum and Company, Inc. (Blum), Wood-Ridge, NJ as indicated below.
 - 2) Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a) Julius Blum and Company, Inc., Wood-Ridge, NJ.
 - b) Blumcraft of Pittsburgh Division of C.R. Laurence Company, Inc., Pittsburgh, PA
 - c) Livers Bronze Company, Kansas City, MO.
 - d) The Wagner Companies, Butler WI.

- b. Top rail: 2-1/2 inch outside diameter by 0.062 inch thick stainless steel ornamental grade tubing equal to Blum "Tubing" with factory mitered 90 degree elbows.
 - c. Handrails: Nominal 1-1/4 inch or 1-1/2 inch schedule 40 stainless steel pipe weighing 2.15 or 2.55 pounds per foot respectively end caps to match material and finish and splice or connector sleeves at joints.
 - d. Wall mounted handrail brackets: Self-aligning wall bracket, 2-1/4 inch long with 3 inch round escutcheon plate for concealed fastening to wall and shoulder to receive railing with two concealed fasteners equal to Blum "Carlstadt No. 242".
 - e. Bracket adapter: 1-1/2 inch pipe size with a 1/2 inch clear hole, stainless steel equal to Blum "No. 9361 Post Bracket Adapter".
 - f. Post mounted handrail brackets: Self-aligning post bracket, 2-1/4 inch long with 5/8 inch wide by 1/2 inch diameter threaded stud to anchor to post and 3 inch wide shoulder to receive railing with two concealed fasteners equal to Blum "Carlstadt No. 222".
 - g. Center post handrail brackets: Self aligning center mount post bracket, 2-1/2 inch long with 3/4 inch wide to receive railing with two concealed fasteners equal to Blum "Carlstadt No. 208".
 - h. Bar shapes: 1 inch by 1 inch inch equal to Blum "Square Bars" or 1 inch by 3/6 inch equal to Blum "True Bars" shop primed for painted finish under Section 09 91 00 – PAINTING
2. Mesh panels:
- a. Manufacturers:
 - 1) Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on McNichols Company, Tampa, FL.
 - 2) Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a) McNichols Company, Tampa, FL.
 - b) GKD Metal Fabrics, Cambridge, MD.
 - c) C.I. Banker Wire + Iron Works, Mukwonago, WI.
 - d) Belleville Wire Cloth Co., Inc., Cedar Grove, NJ.
 - e) WireCrafters, LLC, Louisville, KY.
 - b. Mesh: McNichols "Square Welded Wire Mesh" fabricated from 0.1875 inch diameter carbon steel wire in a 2 inch by 2 inch square pattern, with U edging fabricated 1 inch wide by 18 gauge thick carbon steel with welded mitered corners. All panels shall be shop primed for painted finish under Section 09 91 00 – PAINTING.
- E. Exterior pipe railing system:
- 1. Manufacturers:
 - a. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Julius Blum & Co., Carlstadt, NJ.

- b. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1) Julius Blum & Co., Carlstadt, NJ.
 - 2) C.R. Laurence company, Taunton, MA.
 - 3) The Wagner Companies, Butler, WI.
 - c. Rail system: As manufactured by Julius Blum & Co, product: "Connectorail System" fabricated from Ornamental Grade Stainless Steel (Type 304) components with a No.4 satin finish in 1 1/2 inch schedule 5 sleeved pipe size, with a guaranteed expected yield of 55,000 [psi].
 - d. Railings, posts, fittings, mounting pieces, and related support components, as detailed on the Drawings.
- F. Perforated steel mesh:
- 1. Manufacturers:
 - a. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on McNichols Company, Tampa, FL.
 - b. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1) McNichols Company, Tampa, FL.
 - 2) GKD Metal Fabrics, Cambridge, MD.
 - 3) C.I. Banker Wire + Iron Works, Mukwonago, WI.
 - 4) Belleville Wire Cloth Co., Inc., Cedar Grove, NJ.
 - 5) WireCrafters, LLC, Louisville, KY.
 - c. Mesh Type 1: McNichols "Square Woven Wire Mesh" fabricated from 0.185 gauge carbon steel wire in a 2 inch by 2 inch square pattern, with U edging fabricated 1 inch wide by 18 gauge thick carbon steel with welded mitered corners.
 - 1) Wire mesh characteristics:
 - a) Material: Plain steel.
 - b) Product Type: Square welded wire mesh.
- G. Roof access ship's ladder
- 1. Ship's ladders to roof: Factory engineered and prefabricated aluminum ship's ladder, 75 degree conforming to the following:
 - 2. Extrusion: Aluminum alloy 6063-T-5.
 - 3. Rungs: Deeply serrated not less than 1-1/4 inch in section.
 - 4. Rung load capacity: 1,000 pounds without failure.
 - 5. Stringers; Nominal 6 by 2 inch channel with walls not less than 1/8-3/16 inch thick.
 - 6. Railings: Nominal 1-1/2 inch diameter aluminum tubing.
 - 7. Nominal ladder width between stringers: 24 inches.
 - 8. Finish: Mill finish aluminum.

9. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
 - a. O'Keefes Inc., San Francisco CA, product "Model 523".
 - b. Precision Stair Corporation, Morristown TN, product "Walk-Thru 75 Degree, Model SL".
 - c. Royalite Manufacturing, Inc., Chino, CA, product Standard Model 75° SLL-75.

- H. Lintels: As scheduled on Structural Drawings.
 1. Provide lintels 12 inches longer than masonry openings. Where lintel abuts column, provide structural clip connection.
 2. Lintels occurring in exterior walls shall be galvanized in conformance with the requirements of ASTM A 143, and ASTM A 123.

- I. Bollards: Diameter indicated on the Drawings fabricated from hot dipped galvanized steel, "Standard" pipe conforming to ASTM A 53, Type S, Grade B, with a wall thickness of 0.365-inch. Provide bollards in lengths indicated on the drawings, concrete filled, with domed cap as detailed on Drawing C11.6.

- J. Trench cover: Cast-in anchor type trench liner and cover fabricated from Type 6063-T5 aluminum extrusions complying with ASTM B 221 and Type 5052-H32 aluminum plates complying with ASTM B 209 plates with 1/8 inch tile recess for finished flooring. Plate shall be formed from 3/8 inch thick aluminum trench liner shall be 20 gage G90 galvanized steel sheet.
 1. Manufacturers:
 - a. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Balco, Inc., Wichita, KS, product "TST-6-375L Trench Cover.
 - b. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1) Balco, Inc, Wichita KS.
 - 2) Watson Bowman Acme Corporation (A Division of BASF Construction Chemicals), Amherst NY
 - 3) Construction Specialties, Inc, Muncy, PA.
 - 4) MM Systems Corporation, Pendergrass GA.
 - 5) Nystrom Building Products, Brooklyn Park MN.

End of Section

Section 05 58 13
COLUMN COVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install textured stainless steel and smooth painted metal column covers and all related support accessories.

1.2 RELATED REQUIREMENTS

- A. Section 05 12 00 - STRUCTURAL STEEL FRAMING.
- B. Section 05 50 00 - METAL FABRICATIONS.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Manufacturers' specifications and other data needed to demonstrate compliance with the specified requirements.
 - 2. Shop Drawings in sufficient detail to show layout, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
 - 3. Manufacturers' recommended installation procedures.
 - 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.4 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary, at no change in Contract Sum.

PART TWO - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Pittcon Industries, Inc., Riverdale, MD, Product: "Series 1500" with drywall ceiling trim rings, four inch base reveals and soft "V" joints.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Pittcon Industries, Inc., Riverdale, MD.
 - 2. Protean Construction Products, Inc., Burnsville, MN.
 - 3. Moz Design, Inc., Oakland CA.
 - 4. Southern Aluminum Finishing, Inc. (SAF), Atlanta GA.
 - 5. McNichols Company, Tampa, FL

2.2 COLUMN COVERS

- A. Typical column covers shall be roll formed from sheet metal in configuration indicated on Drawings
 - 1. Sheet metal: Rimex Metals USA, product "Patterned Finishes, No. 6-OM" stainless steel; or approved equal.
 - a. Typical columns: Type 304 satin finished stainless steel column covers are roll formed with a patterned finish with dimples facing out.
 - 2. Support struts: 12 gage steel channel/brackets, formed steel
 - 3. Clip assembly: Formed 26 gage stainless steel.
 - 4. Cover design:
 - a. Shape: Round.
 - b. Vertical joints: Round column covers shall be in 3 section units.
 - c. Horizontal joints: None between capital and base.
 - d. Seam Design: Single butt joint at vertical seams.
 - 5. Column cover system shall be positive self-aligning snap together type without exposed fasteners or supports.
- B. ROTC column covers shall be roll formed from sheet metal in configuration indicated on Drawings
 - 1. Sheet metal: Aluminum column covers are roll formed from 1/8 inch thick satin finished aluminum column covers with a painted finish.
 - 2. Support struts: 12 gage steel channel/brackets, formed steel
 - 3. Clip assembly: Formed 26 gage stainless steel.
 - 4. Cover design:
 - a. Shape: Round.
 - b. Vertical joints: Round column covers shall be in 3 section units.
 - c. Horizontal joints: None between capital and base.

- d. Seam Design: Single butt joint at vertical seams.
 5. Column cover system shall be positive self-aligning snap together type without exposed fasteners or supports.
- C. Aluminum finish: Shop-applied, fully oven cured Polyvinylidene Flouride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), NAAMM - Metal Finishes Manual, and the following:
1. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
 2. Finish Coating shall be manufactured as one of the following products:
 - a. Glidden Company; product "Visulure."
 - b. Morton International; product "Fluoroceram CL."
 - c. PPG Industries Inc.; product "Duramar XL."
 - d. Valspar Corp., product: "Flurothane."
 3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
 4. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
 5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
 6. Finish Coat (Color Coat): Polyvinylidene flouride enamel averaging 0.70 to 0.80 mil dry film thickness.
 7. Top Coat: Polyvinylidene flouride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
 8. Color and Appearance: Provide custom colors as provided by Architect including colors designated by the coating manufacturer as "bright," "premium," "pearlescent," or "metallic".
 - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examination of surfaces: Installer shall examine conditions under which work is to be performed and shall notify Architect in writing of unsatisfactory conditions. Installer shall not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 INSTALLATION

- A. Manufacturer's recommendations: Comply with manufacturer's written installation instructions and comply with governing regulations and industry standards applicable to the work.

3.3 ADJUSTING AND TESTING

- A. Inspection: Inspect system components for proper operation and fit. Adjust, repair or replace components not conforming to requirements.

3.4 PROTECTION

- A. Procedures: Protect finished work from damage during remainder of construction period.
- B. Damage to Finished Work: Finished units shall be without damage. Damage shall be repaired.
- C. Storage: Metal column covers shall be stored on the job in an area free from moisture and in accordance with manufacturer's explicit instructions.

End of Section

Section 05 71 13
FABRICATED METAL SPIRAL STAIRS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 05 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract: As provided under Section 05 00 01 – MISCELLANEOUS AND ORNAMENTAL IRON TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 05 00 01.

1.2 SUMMARY

- A. Furnish and install:
 - 1. Shop finished, pre-fabricated sectional, center support spiral stair, with radial shaped treads, landing construction, supporting members and railings.
- B. Perform all shop-painting for all surfaces of exposed to view, and post-erection touch-up of shop prime coat, using the same material as shop-prime coating.

1.3 RELATED REQUIREMENTS

- A. Section 05 50 01 – MISCELLANEOUS AND ORNAMENTAL IRON TRADE CONTRACT REQUIREMENTS.
- B. Section 05 50 00 - METAL FABRICATIONS: Miscellaneous metal fasteners for stair assembly.
- C. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.
- D. Section 09 91 00 - PAINTING: Applied finish coatings other than those specified herein.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. NAAMM - Metal Stairs Manual.
 - 2. ASTM A 36 - Structural Steel
 - 3. ASTM A 53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
 - 4. ASTM A 283 - Carbon Steel Plates, Shapes, and Bars
 - 5. ASTM A 307 - Carbon Steel Externally Threaded Standard Fasteners
 - 6. ASTM A 500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes

7. ASTM A 501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
8. ASTM A 167 - Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
9. ASTM A 525 - Specification for Sheet Steel, Zinc Coated (Galvanized).
10. ASTM B 209 - Specification for Aluminum Alloy, Sheet and Plate.
11. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
12. ASTM B 221 - Specification for Aluminum Extrusions.
13. AWS - Standard Code for Arc and Gas Welding in Building Construction.
14. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.

1.5 PERFORMANCE REQUIREMENTS

- A. Stair and railing performance requirements; conform to all requirements of those codes and regulations referenced under Section 01 41 00 - REGULATORY REQUIREMENTS.
 1. Design, fabricate and install stairs to safely support a minimum live load of 100 pounds per square foot for treads, and 150 pounds per square foot for landings, or a concentrated load of 300 pounds for each condition. Provide all supporting steel shapes and connections.
 2. Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads required under Section 1109 of the Massachusetts State Building Code.
 3. Verify heights shown in Drawings comply with referenced codes and regulations.
- B. Sizes of all headers, stringers, and other structural members; and gauges and configurations of all riser tread and landing plates and pans, handrails, stringers, and posts shall be as indicated on the approved shop drawings, and in accordance with the standards of the National Association of Architectural Metal Manufacturers.

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's complete product data and specifications for all stair components, connection details, shop primer and finish coatings, and hydraulic cements, to be furnished hereunder.
 2. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
 3. Shop drawings:
 - a. Include large scale details, show proposed methods of anchorage to surrounding structure and conditions, indicate supporting accessories and connections, floor opening details, required floor opening and stair height tolerances and other measurements affecting the stair.
 - b. Include large scale details of stairs, intermediate landings and railings, bearing registration stamp of a Professional Structural Engineer

registered in Commonwealth of Massachusetts, indicated on shop drawings support loads.

4. Delegated Design Submittals: Provide calculations for loading and stresses for the work of this section, bearing the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements as required by the Massachusetts State Building Code have been satisfied.
5. Selection samples (submit two each):
 - a. Sample card indicating full range of Manufacturer's colors available for selection by Architect.
 - b. Provide additional samples as requested by Architect for initial selection of colors and finishes.
6. Verification samples (submit two each):
 - a. full size sample of a tread, illustrating material and finish.
 - b. 12 inch long samples of railing, illustrating material and finish.
7. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- B. Submit manufacturer's warranties under provisions of Section 01 78 00 - Closeout Submittals.

1.7 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Exposed Fabricated Steel Elements including stairs, railings, ornamental fabrications and exposed to view fabrications shall be fabricated and finished as Architectural Exposed Structural Steel (AESS) meeting tolerances and fabrication requirements as specified herein.
- C. Qualifications:
 1. Welders: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
 2. Licensed Professionals: Provide the services of a Professional Structural Engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this section meets or exceeds the performance

requirements specified in this section and as required by Massachusetts State Building Code.

- a. Prepare Shop Drawings for under direct supervision of a same Engineer experienced in design of this work.

1.8 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.9 DELIVERY, STORAGE AND HANDLING

- A. All materials under this Section shall be carefully prepared for delivery, and handled and stored under cover in a manner to prevent defacement, deformation, or other damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter on the metal work. All such work shall be repaired and cleaned prior to erection.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products are limited to the following:
 1. Salter Spiral Stairs, Collegetown, PA.
 2. The Iron Shop Spiral Stairs, Broomall, PA.
 3. Atlantic Stairworks Inc., Newburyport, MA.

2.2 PREFABRICATED SPIRAL STAIRS

- A. General Stair description: 6'-0" minimum diameter clockwise spiral stair, having a height of 29 feet - 1 inch, (field verified) having the following components:
 1. Minimum steel center pole diameter 4 inches.
 2. Treads and risers: Heavy duty, heavy gauge raised diamond surface pattern steel plate treads with full closure riser plates and closed tread ends, 30 degrees of rotation per tread section.
 3. Top platform: (1) 60 degree top platform.
 4. Riser quantity: A total of 37 risers with a maximum riser height of 9 ½ inches.
 5. Minimum clear tread depth of 7 ½" at a point 12" from the narrow edge of the tread.
 6. Minimum clear walk space between the center pole and the handrail shall be 32 inches.
 7. The minimum clear headroom shall be 78 inches.
 8. Handrail assembly:
 - a. 1 inch round steel spindles, (4 per tread) with maximum clear spacing of 4 inches.

- b. Top of handrail shall be 42 inches above the nosing of the tread.
 - c. Handrail: ASTM B26 or B108, alloy 319 circular aluminum handrail, 1 ½ inch diameter, straight top landing guardrail.
9. Fasteners: Manufacturer's standard, of same metal as fastened metal except use stainless steel for fastening of aluminum components.

2.3 ACCESSORIES

- A. Provide all fasteners and attachments of the same material and finish as the metal to which it is applied unless otherwise noted. Provide all fasteners and attachments as required for work specified herein and as indicated on the Drawings.
- B. Adhesive for attaching anchors and for direct pinning: high-modulus, high strength, moisture tolerant, epoxy adhesive, two-component 100 percent solids, epoxy resin complying with ASTM C 881.
 - 1. Minimum performance properties (as cured at 70 degrees F. and 50 percent relative humidity):
 - a. Minimum Compressive Strength, tested per ASTM D-695:
 - 1) at 3 days: 11300 psi (31.0 MPa).
 - 2) at 7 days: 11800 psi (44.8 MPa).
 - 3) at 28 days: 12200 psi (58.6 MPa).
 - b. Shear Strength, tested per ASTM D-732 at 14 days: 6200 psi (43 MPa)
 - c. Minimum Flexural Strength tested per ASTM D-790 at 14 days: 10700 psi (74 MPa).
 - d. Minimum Bond Strength tested per ASTM C-882 at 14 days:
 - 1) Plastic Concrete to Hardened Concrete 2200 psi (13.8 Mpa).
 - 2) Plastic Concrete to Steel 2000 psi (13.8Mpa).
 - e. Maximum Water Absorption, tested per ASTM D-570: 24 hour 0.27%
 - f. Minimum Tensile properties tested per ASTM D-638: Tensile Strength 6900 psi (48 Mpa).
 - 2. Products which may be considered as equal include the following, or approved equal:
 - a. Sika Corporation, Lyndhurst NJ., product: "Sikadur 32 Hi-Mod Gel.
 - b. Simpson Strong Tie, Pleasanton, CA., product "SET High Strength Epoxy".
 - c. Symons Corporation, Des Plaines, IL., product "Rescon Gel anchor 304".

2.4 FABRICATION - GENERAL

- A. Refer to the Drawings for location and details of steel stairs and railings (handrails and guardrails) to be furnished and installed hereunder.
 - 1. Verify heights shown in Drawings comply with referenced codes and regulations.
 - 2. Verify field measurements with approved Shop Drawings prior to fabrication.
- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for

NAAMM Stair Standard, Architectural class, unless more stringent requirements are indicated.

- C. Performance requirements; conform to all requirements of those codes and regulations referenced under Section 01 41 00 - REGULATORY REQUIREMENTS.
 - 1. Stairs: Design, fabricate and install stairs to safely support a minimum live load of 100 pounds per square foot and a concentrated load of 300 pounds on any area of four square inches as required under Section 1607 of the 2009 International Building Code with Massachusetts Building Code, Eighth Edition amendments.
 - 2. Railings: Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads as follows and as required under Section 1607 of the 2009 International Building Code with Massachusetts Building Code, Eighth Edition amendments.
 - a. Resist a load of 50 pounds per linear foot (0.73 kN/m) applied in any direction at the top and to transfer load through railing supports to structure.
 - b. Resist a single concentrated load of 200 pounds (0.89kN) applied in any direction at any point along the top, and to transfer load through railing supports to structure. Concentrated loading requirements are not concurrent with other loading requirements.
 - c. Intermediate rails, balusters and panel fillers shall resist a horizontally applied load of 50 pounds (0.89 kN) on an area equal to 1 square foot (.093m²), including openings and space between rails. Reactions due to this loading are not required to be superimposed with loadings specified for top rail.
 - D. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting; well formed and finished to shape and size, true to details with straight, sharp lines, and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.
 - E. Shop fabricate items, accurately fitting all parts and making all joints tight. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
 - F. Do all cutting, punching, drilling, and tapping required for attachment of anchor bolts and other hardware and for attachment of work by other trades. All such work shall be done prior to shop finishing of the various components.
 - G. Grind all edges of bars and plates completely free from nicks and machine marks, prior to shop priming and finishing
 - H. Carefully coordinate the installation of spiral stairs with the work of trades responsible for the installation of interfacing work, and for the installation of work into the various assemblies furnished hereunder, and permit the installation of the related materials to be made at the appropriate times.
- 2.5 SHOP APPLIED FINISHES
- A. Powder coat finish:

1. Surface preparation prior to priming and finishing: Thoroughly clean all steel of all loose mill scale by power wire brushing or sandblasting. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter by wire-brushing or scraping (power wire-brushing, if necessary). Grind smooth any sharp projections.
2. Apply zinc-phosphate treatment in a continuous five-state process. Following zinc-phosphate treatment, apply electro-statically applied powder coat finish in color selected by Architect.
3. Powder coating epoxy coating, as manufactured by TIGER Drylac, Reading PA (610) 926-8148, Product Special Series 49 in smooth Semi-Gloss finish or approved equal.
 - a. Film Thickness: 2.5-3.5 mils, dry film thickness.
 - b. Gloss: 55-65° (per gardener 60°, ASTM D523).
 - c. Cross hatch adhesion test (per ASTM D3359): rated 5B.
 - d. Mandrel bending test (per ASTM D522) 4mm (5/32 inch).
 - e. Impact test (per ASTM D2794), Up to 120 in-lb.
 - f. Pencil Hardness (ASTM B3363) 2H (minimum).
 - g. Humidity resistance, maximum blistering (1500 hours, ASTM D2247): 1 mm (0.04 inch).
 - h. Acid salt spray resistance, maximum undercutting (1500 hours, ASTM G85): 1 mm (0.04 inch).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are acceptable to suit stair assembly tolerances. Verify that supports and anchors provided by applicable Trade Contractors are correctly positioned.
- B. Beginning of installation means acceptance of project conditions.

3.2 ERECTION

- A. Accurately set all work to established lines and elevations, and rigidly fasten in place with suitable attachments to the construction of the building. At the completion of the work, check all work, re-adjust as required, and leave in perfect condition.
 1. Erect stair in conformance with the following tolerances:
 - a. Maximum variation from plumb: 1/4 inch (6 mm) for full height of stair.
 - b. Maximum angular variation of tread from true position: 3 degrees.
- B. Install stair assembly in accordance with manufacturer's instructions, and in strict accordance with the details, the approved shop drawings, and requirements of all codes, laws, and ordinances bearing on the work.
 1. Advise if field conditions exceed adjustment limits of attachments. Do not field cut or modify stair components.

- C. Touch-up all welds, scratches, abrasions, and other surface damaged on shop-primed or painted metals, using the same coatings as specified under shop applied finishes, herein above.

3.3 PROTECTION OF FINISHED WORK

- A. Do not permit traffic on stair after installation.

End of Section

Section 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of rough carpentry where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
1. Wood vehicular guardrails.
 2. Temporary entrances including tube footings, wood stairs, metal railings, roof canopies and asphalt shingle roofing for Site Enabling Work indicated on the Drawings.
 3. Stage subflooring and cushioned sleepers.
 4. Fire retardant treated (FRT) plywood backer panels for mounting of electrical panelboards, telephone/data backboards, HVAC and fire control equipment and other equipment.
 5. Backing panels at utility closets.
 6. Backer rod and AVB membrane for connection to exterior hollow metal frames for doors.
 7. Various wood blockings, edgings, nailers, curbs, cants, grounds, furring, sheathing, framing members including wood preservative or fire retardant treatment as indicated, as required for receipt of various finishes and surfacing materials, not described herein above.
 - a. Curtain wall, windows, louvers and doors.
 - b. Roofing system, edges, curbs, openings, blocking at roof drains.
 - c. Blocking for roof access ladders.
 - d. Door hold open devices, all wall door stops, all hardware and other attached items.
 - e. Provide exterior grade fire rated blocking at exterior canopies.
 - f. Blocking for all specialty items such as millwork, cabinets, accessories, lockers, and all other in wall blocking required for other trades.
 8. Temporary barriers, rough hardware, and required railings, supports, environmental barriers and related required temporary construction required, and for the phasing and work controls.
 9. Rough installation hardware, including bolts, screws, spikes, nails, clips, and connection assemblies, as needed for installation of the rough carpentry work.
 - a. All construction including materials and systems, on exterior side of air/vapor barrier shall be considered exterior and be attached with stainless steel or corrosive resistant fasteners. Fasteners sized over ½ inch in diameter may be hot-dip galvanized.
- C. Install the following furnished under the designated Sections:

1. Metal door frames furnished under Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.
 - a. Place frames and erect in correct positions within specified tolerances. Additionally provide temporary bracing at locations where frames are indicated to be built-into masonry. Section 04 20 00 - UNIT MASONRY shall grout frames and "build-into" into masonry work.
 2. Metal door frames furnished under Section 08 12 16 - ALUMINUM FRAMES.
 - a. Place frames and erect in correct positions within specified tolerances. Additionally provide temporary bracing at locations where frames are indicated to be built-into masonry. Section 04 20 00 - UNIT MASONRY shall grout frames and "build-into" into masonry work.
 3. Concealed anchorage devices for handicap handrails in toilet rooms: Section 10 28 13 - TOILET ACCESSORIES.
 4. Mineral wool insulation at hollow metal and overhead door frame perimeter furnished and installed under this Section refer to Section 07 21 00 – THERMAL INSULATION for product requirements.
- D. Coordinate work of this Section with the work of the various trades responsible for applying finish materials and other items to rough carpentry work. Furnish and install furring, blocking, and shims, and other usual items of normal rough carpentry work as required by the various trades for the proper completion of the project.
1. The applicable requirements specified in Part 1 - GENERAL and Part 3 - EXECUTION of the individual specification sections furnishing materials to be installed under this Section, shall be included in and made a part of this Section.
- E. No attempt is made in this Section to list all elements of rough carpentry required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.
- F. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.
- 1.2 RELATED REQUIREMENTS
- A. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

- B. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- C. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- D. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 04 20 00 - UNIT MASONRY: Building-into masonry hollow metal door frames, placed and braced under this Section 06 10 00 - ROUGH CARPENTRY.
- G. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural steel framing.
- H. Section 06 20 00 - FINISH CARPENTRY: Wood interior and exterior trim.
- I. Section 06 40 00 - ARCHITECTURAL WOODWORK: Laminate clad casework and countertops.
- J. Section 07 21 00 - THERMAL INSULATION: Thermal insulation between framing, and vapor barrier.
- K. Section 07 54 19 – POLYVINYL-CHLORIDE (PVC) ROOFING: Furnishing and installation of roof nailers and blocking under this Section 06 10 00 – ROUGH CARPENTRY. Installation of roof board furnished under this Section 06 10 00.
- L. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Flashing, gutters and miscellaneous sheet metal work.
- M. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Furnishing hollow metal framing.
- N. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Metal framing for drywall construction.
- O. Section 09 29 00 - GYPSUM BOARD: Wallboard construction work, having taped and compounded joint finish.
- P. Section 09 91 00 - PAINTING: Applied primer and finish coatings to exposed to view rough carpentry work.
- Q. Section 10 28 13 - TOILET ACCESSORIES: Providing anchorage devices and mounting templates for toilet accessories.
- R. Section 12 30 00 - CASEWORK: Manufactured casework.
- S. Section 12 35 53 – LABORATORY CASEWORK: Manufactured science casework.
- T. Division 26 - ELECTRICAL: Providing and mounting electrical panels and equipment.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. APA - applicable grades and specifications.
 2. APA PRB-108 Performance Standards and Policies for Structural-Use Panels.
 3. ANSI A250.11 (formerly SDI 105) - Recommended Erection Instructions for Steel Doors and Frames.
 4. ASTM D 3201 - Test Method for Hygroscopic Properties of Fire-Retardant Wood.
 5. AWWA Standards and references for preservative treated wood including Standards UC1, UC2, UC3A, UC3B, UC4A, and P5
 6. AWWA Standard UCFA – Fire Protection as Required by Codes Above Ground Interior Construction.
 7. AWWA Standard UCFB – Fire Protection as Required by Codes Above Ground Exterior Construction.
 8. AWWA M4 – Care Of Preservative Treated Wood Products.
 9. FSC (Forest Stewardship Council): “FSC Certification Program”
 10. NER-643: ACQ Preserve® and ACQ Preserve Plus® Wood Preservative Treatment, ICBO Evaluation Service.
 11. MIL L-1914OE - Lumber and Plywood, Fire Retardant Treated.
 12. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
 13. SPIB Grading Rules, current edition.
 14. UL - Building Materials Directory
 15. US. Department of Commerce Voluntary Product Standard PS1 for Construction and Industrial Plywood.
 16. US. Department of Commerce Voluntary Product Standard PS2 for Wood-Based Structural-Use Panels.
 17. US. Department of Commerce Voluntary Product Standard PS-20 - American Softwood Lumber Standard.
 18. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber
 19. American Lumber Standards Committee, National Lumber Grades Authority for Canadian Lumber, and applicable grading rules and standards of the various lumber associations whose species are being used for grades specified.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Coordinate the work of this Section with the respective trades responsible for locating anchorages installed into blocking which is provided under this Section.

2. Coordinate work of this Section with the work of the various trades responsible for applying finish materials and other items to rough carpentry work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for products specified herein.
 2. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 - a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards.
 - 1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor's chain of custody number and identify each chain of custody certified product on a line-item basis. A "vendor" is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
 - b. Composite Wood and Agrifiber Products Include certification indicating compliance with the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda for all composite wood and agrifiber products.
 - c. Written certification from the respective treatment plants indicating types of wood preservative treatment and fire retardant treatment used, treatments method, applications instructions, and conformance to the requirements specified herein.
 - 1) Provide certification that fire retardant treatment materials do not contain ammonium phosphate.
 - 2) Provide report from ICC Evaluation Service on fire retardant treated wood flame spreading, strength, corrosion and hygroscopic properties.
 - 3) Provide report from ICC Evaluation Service on pressure preservative treated wood strength, corrosion, anti-fungi, and anti-insect properties.
 3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.

- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.
- g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - 1. All lumber shall:
 - a. Be new, dressed four sides (S4S), clear and free from warping and other defects.
 - b. Have a moisture content not exceeding 19 percent when delivered to the project.
 - c. Be in accordance with the grading rules of the lumber manufacturer's association under whose jurisdiction the lumber is produced and bear the mark of grade and mill identification.
- B. Certifications:
 - 1. All wood products furnished under this Specification Section shall be "FSC Certified" according to the rules of the Forest Stewardship Council (FSC).
 - a. FSC Certification includes the following certification bodies of forests and forest products:
 - 1) SCS Global Services.
 - 2) SmartWood.
 - 3) SGS Qualifor.
 - 4) Soil Association.

2. Plywood: Conform to the requirements of Product Standard PS-1, and bear applicable APA grade trademarks.
 - a. Plywood for electrical boards treated for retardance, meet Class I or a flame spread rating of 25 or less and bear U.L. label "Classified FRS".

1.7 MOCK-UP

- A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.8 PRE-INSTALLATION CONFERENCE

- A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Storage and Handling Requirements:
 1. Protect wood materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 2. Store materials in an elevated dry location, protected by waterproof coverings.

PART 2 - PRODUCTS

2.1 BOARD AND SHEET MATERIALS

- A. Sustainable Forest Certification: All wood shall be "Chain-of-Custody" certified as FSC Certified.
- B. Framing Lumber for studs, beams, joists, rafters, and headers: No. 2 Spruce/Pine/Fir (SPF), or No. 2 Southern Pine, Grade-stamped S-Dry or other surface dried wood species, Number 2 grade or better having a minimum bending stress Fb of 775 PSI (890 PSI repetitive) and modulus of elasticity E not less than 1100 KSI.
- C. Lumber for blocking, nailers and curbs as indicated or required: Hem-Fir, Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried stud or utility grade. Wood members shall be of sizes indicated on the Drawings or of the same size as the members being braced.
 1. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
 2. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.
- D. Furring: Nominal 1 by 3 inches or 1 by 4 inches Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried construction grade.
- E. Plywood and sheet products:

1. Stage subflooring: ½ inch thick, APA graded, CDX-EXT plywood, plugged and touch sanded.
2. Stage cushioned sleepers: Cushioned sleepers with resilient rubber pads and plywood panel encased in a steel channel.
 - a. Anchoring: Provide RAWL spikes or approved equal fasteners in lengths as dictated by site conditions to achieve minimum 900 lbs. pullout strength.
 - b. Spacing: 16 inches on center (maximum) or as indicated on Drawings.
 - c. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and Specifications have been based on Connor Sports Hardwood Systems "PermaFlex II" Fixed Resilient System.
 - 1) Acceptable manufacturers:
 - a) CSF Floor Systems, product "Anchored PowerSleeper SE".
 - b) CourtSports, product "Pro-Defender Power Channel System".
3. Interior wall sheathing: APA-rated sheathing, ¾ inch (19.1 mm) thick having a minimum span rating 48/24, 5 ply/5 layer plywood touch-sanded.
4. Roof sheathing: 5/8 inch (15.9 mm) thick having a minimum span rating 40/20, APA RATED SHEATHING, STRUCTURAL 1, exposure durability classified, EXPOSURE 1, plywood touch-sanded.
5. Marine grade plywood: EWA MARINE A-A EXT, fir veneer marine grade plywood, with plugged cores and sanded faces.
6. For substrate beneath gypsum board: Square edge APA graded C-D-X EXT, touch-sanded, ¾ inch thick, except as otherwise indicated on the Drawings
7. For electric panel board mountings and similar uses: APA graded B-D INT, Group 2 species, touch-sanded, fire-retardant treated, ¾ inch thick, except as otherwise indicated on the Drawings.
8. For unspecified interior concealed from view locations: APA graded C-D PLUGGED INT, Group 2 species, thickness as indicated on the Drawings.

2.2 WOOD TREATMENTS

- A. Treated wood products shall be produced by a single treatment plant, fully licensed by the chemical manufacturers, and conforming to the requirements specified herein.
 1. Toxicity and Environmental Quality:
 - a. Products containing chromium will not be permitted.
 - b. Products containing arsenic will not be permitted.
 - c. Fire-retardant-treated wood products shall be free of halogens, sulfates, ammonium phosphate and formaldehyde.
 2. Dye wood or otherwise color code all treated wood at treatment plant to clearly distinguish the different treatments in the field.
 3. Kiln dry all treated lumber and plywood to the following maximum moisture content after treatment.
 - a. Lumber: 19 percent.
 - b. Plywood 15 percent.

- c. Discard pieces with defects which might impair quality of work.
 4. Quality marks: Each piece of lumber and plywood shall be permanently affixed with a quality mark, containing the following information:
 - a. Identification of the inspection agency.
 - b. Standard to which material was treated.
 - c. Identification of the treating plant.
 - d. Fire retardant treated wood shall include: stamp signifying a FR-S rating
 - e. Preservative treated wood shall include: Retention and end use for which product is suitable.
- B. Interior fire retardant treated wood.
 1. Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include the following or approved equal:
 - a. Hickson Corporation, product, "Dricon".
 - b. Koppers Performance Chemical, Inc., Griffin GA., product "FirePro".
 - c. Hoover Treated Wood Products, Inc., product "PyroGuard".
 - d. Viance, LLC., Charlotte, NC, product: "D-Blaze FRT".
 2. Fire retardant treated wood shall comply with the following requirements:
 - a. All fire-retardant lumber and plywood must have an Underwriters Laboratories stamp signifying a FR-S rating certifying a 25 or less flame spread and smoke developed value, when tested in accordance to ASTM E-84, or UBC Standard No. 42-1.
 - b. Corrosion rates: Less than one mil per year for carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood when tested in accordance with Federal Specification MIL-L-19140E Paragraph 4.6.5.2.
 - c. The fire retardant treated wood must have an equilibrium moisture content of not more than 25 percent when tested in accordance with ASTM D 3201 procedures at 95 percent relative humidity and 80 degrees Fahrenheit.
 - d. Fire retardant chemical: Registered for use as a wood preservative by the U.S. Environmental Protection Agency.
 - e. Testing: Fire performance and strength properties for both lumber and plywood, of the fire retardant treated wood shall be recognized by issuance of a ICC Evaluation Service Report. Fire retardant chemical must not damage the middle lammella of the wood structure when exposed to 170 degrees Fahrenheit and 90 percent relative humidity for 23 days.
- C. Exterior fire retardant treated wood.
 1. Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include the following or approved equal:
 - a. Hickson Corporation, product, "FRX".
 - b. Hoover Treated Wood Products, Inc., product "Exterior Fire-X".

- c. Chicago Flameproof, Montgomery, IL, product "Exterior FRT".
 2. Fire retardant treated wood shall comply with the following requirements:
 - a. All fire-retardant lumber and plywood must have an Underwriters Laboratories stamp signifying a FR-S rating certifying a 25 or less flame spread and smoke developed value, when tested in accordance to ASTM E-84.
 - b. Corrosion rates: Less than one mil per year for carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood when tested in accordance with Federal Specification MIL-L-19140E Paragraph 4.6.5.2.
 - c. The fire retardant treated wood must have an equilibrium moisture content of not more than 19 percent when tested in accordance with ASTM D 3201 procedures at 95 percent relative humidity and 80 degrees Fahrenheit.
 - d. Fire retardant chemical: Registered for use as a wood preservative by the U.S. Environmental Protection Agency.
 - e. Testing: Fire performance and strength properties for both lumber and plywood, of the fire retardant treated wood shall be recognized by issuance of a ICC Evaluation Service Report. Fire retardant chemical must not damage the middle lammella of the wood structure when exposed to 170 degrees Fahrenheit and 90 percent relative humidity for 23 days.
 - D. Pressure preservative treated wood. Designated as "PT"
 1. Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include the following or approved equal:
 - a. Osmose, Inc., Griffin GA., product "NatureWood".
 - b. Universal Forest Products, Inc., Grand Rapids MI., product "ProWood ACQ".
 - c. Viance, LLC., Charlotte, NC., product "Preserve"
 2. Treatment: Ammoniacal Copper Quaternary Compound (ACQ), arsenic-free and chromium-free chemical "ACQ Preservative" in accordance with AWPA Standards. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
 - a. Minimum preservative retention for floor plates, framing, lumber and plywood above ground use: 0.25 pounds per cubic foot (4.0 kg/m³) of ACQ chemical, in accordance with AWPA UC1, UC2, UC3A, and UC3B, or NER-643 as appropriate.
 - b. Minimum preservative retention for framing, lumber and plywood in contact with water, ground, concrete and masonry: 0.40 pounds per cubic foot (6.4 kg/m³) of ACQ chemical, in accordance with AWPA UC4A, UC4B, UC4C, or NER-643 as appropriate.
 - c. Minimum preservative retention for lumber and plywood in permanent wood foundations: 0.60 pounds per cubic foot (9.6 kg/m³) of ACQ chemical, in accordance with AWPA UC4B, or NER-643.
 3. Fixation of Chemical: Treated wood shall not be shipped from treatment plant until fixation of the preservative has occurred in the wood.
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2.3 ACCESSORIES

- A. Adhesives:
1. General: Provide adhesives which are low-VOC or non-VOC, non-flammable, water-proof after cured, odor free.
 2. Adhesive for lamination and fabrication of wood and plywood items: Exterior adhesives containing no urea formaldehydes, having a VOC limit of 70 g/L.
- B. Fasteners:
1. General: Any materials or building systems on exterior side of air/vapor barrier shall be considered exterior and should be attached with stainless steel or corrosive resistant fasteners. Fasteners sized over ½ inch diameter can be hot-dip galvanized.
 2. Nails (interior and exterior): Galvanized common nails, of size and type to suit application and as required by state and local building codes.
 3. Screws:
 - a. Screws for interior applications: Flat head electroplated-galvanized wood screws of the appropriate sizes.
 - b. Screws for exterior applications:
 - 1) For pressure preservative treated wood: Flat head stainless steel, wood screws, of the appropriate sizes. Aluminum and coated metals are prohibited.
 - 2) For general application (non-pressure preservative treated wood): Flat head hard aluminum, or stainless steel, wood screws, of the appropriate sizes.
- C. Anchor bolts, expansion bolts and lag screws: Hot-dipped galvanized steel, of the following types:
1. For lumber having actual thickness of 1-1/2 inches or greater to masonry and concrete: Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, 3/8-inch minimum diameter, spaced as shown on drawings, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
 2. For lumber having actual thickness of greater than 7/8-inch but less than 1-1/2 inches to masonry and concrete: Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, at least 1/4-inch diameter of the most appropriate lengths for the specific application, spaced as shown, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
 3. For lumber having actual thickness of 7/8-inch and less: Anchor bolts or expansion bolts, at least 1/4-inch in diameter; or screws, of the most appropriate sizes; in lengths most suitable for the specific application, countersunk, spaced, and staggered.
- D. Protection paper: Canadian red-rosen paper or kraft paper.
- E. Building paper: ASTM D 226, Non-perforated, No. 15 (73 kg/sq m) asphalt-saturated building felt.

PART 3 - EXECUTION

3.1 PREPARATION

- A. All materials shall be inspected before use, with all checked, split and otherwise deficient stock rejected, or used only for miscellaneous blocking, furring or other incidental use. The Contractor shall be responsible for replacing all lumber which, due to warpage, twist, splitting, or checking, results in unsatisfactory work. Such replacement shall be required at any time, whether before or after application of finish material under other Sections.
- B. Verify exact locations of toilet accessories, door stops and similar items with Architect prior to installation of blocking for accessories.

3.2 INSTALLATION - GENERAL

- A. Closely coordinate the installation of the rough carpentry work with the work of other trades responsible for the installation of interfacing or overlaying materials, so as not to delay the work of the related trades.
- B. Erect all rough carpentry work plumb, level, and true with tight, close fitting joints, securely attached and braced to surrounding construction, all in a first class workmanlike manner. Counterbore for bolt heads, nuts, and washers where required to avoid interference with other materials. Bear complete responsibility for structural integrity, connections, and anchorage of all rough carpentry work.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- D. Use as long lengths as practicable for wood nailers, blockings, and curbs, to minimize number of joints, and attach the members with the types, and spacing, of fasteners specified herein.
- E. Install blocking, grounds and furring, as required for proper attachment of the work of other trades, in accordance with the requirements provided by the respective related trades.
 - 1. Spacing for furring and strapping shall not exceed 16 inches on center.
- F. Field cuts of fire retardant treated lumber: Do not rip or mill fire retardant treated lumber. Only end cuts, drilling holes and joining cuts are permitted.
- G. Field cuts of ACQ pressure-treated lumber: Apply solution of copper naphthenate containing a minimum of 2 percent metallic copper in-solution, in accordance with AWWA standard M4. Brush liberally all cuts and holes.
- H. Install concealed from view plywood with specified fasteners spaced not more than 10 inches on centers.
- I. Install fire-treated plywood backer boards with counter-sunk galvanized fasteners, of specified sizes, spaced not more than 12 inches on centers.

3.3 INSTALLATION - ROOF NAILERS AND BLOCKING

- A. General: Provide anchorage for nailers as required for roof and edging, coordinate requirements with Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING.
 - 1. Bolt blocking to steel angles.
- B. When building up layers of nailers and blocking, fully secure each layer to at least the one below, alternating location of fasteners, spacing at 12 inches on center. Provide fasteners in lengths to penetrate through more than one substrate layer of blocking. Stagger locations of butt ends of boards, such that no two joints are “lined up”.
- C. Ensure finished height of nailers is same as top surface of roof insulation within 1/4-inch, plus or minus.

3.4 INSTALLATION – EQUIPMENT BACKBOARDS

- A. Provide panel mounting backboards for HVAC, Fire Prevention, Electrical and telephone/data equipment. Fabricate panels using fire-retardant treated 3/4 inch thick panels mounted to fire-retardant treated 2 by 4's. Provide a nominal space of 3-1/2 inches behind panels to permit wiring.

3.5 INSTALLATION - METAL DOOR FRAMES

- A. Place in position all steel frames, furnished under Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES, in accordance with the approved shop drawings and frame schedule.
 - 1. During the installation of metal door frames, after the manufacturer's steel spreader bar has been removed, install wood spreaders at door opening, carefully dimensioned to permit square, true installation of door frames and doors.
 - 2. Spreaders and bracing shall remain in place until doors are installed.
- B. Coordinate installation of frames with the various trades installing abutting wall construction for anchor placement.
 - 1. Place, erect and level all frames into correct scheduled locations, including those in masonry partitions.
 - 2. Provide temporary spreaders and bracing for door frames to be installed into masonry partitions. Maintain frame position with temporary bracing until frames are built-into-place under Division 4 - MASONRY.
- C. Coordinate installation of frames with installation of hardware under Section 06 20 00 - FINISH CARPENTRY and as furnished under Section 08 71 00 - DOOR HARDWARE. Installer to prepare frame in masonry to receive hardware and wiring.
- D. Install frames in accordance with the manufacturer's recommendations, ANSI/SDI-100, SDI-105, and the Door Hardware Institute (DHI) recommendations.
 - 1. Provide rigid temporary bracing for frames as required to ensure maintenance of positioning, and remove only after frames have been permanently anchored.
 - 2. Where exposed fastener heads occur in frames, fill with automotive body filler and sand smooth.

3.6 TOLERANCES

- A. Door frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

3.7 CLEANING

- A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
- B. Daily clean work areas by sweeping and disposing of scraps and sawdust.
- C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

3.8 SCHEDULES

- A. Wood treatment schedule:
1. Pressure preservative treat all concealed or exposed-to-view:
 - a. Lumber and plywood which comes in contact with concrete, masonry, or earth.
 - b. Lumber and plywood nailers, blocking and curbing directly related to roofing, flashing, and roof accessories.
 - c. Lumber and plywood rough-bucks, blocking and nailers directly related to windows and storefront systems.
 2. Fire retardant treat all equipment backer boards, additionally provide fire retardant treated lumber and plywood where indicated or noted on Drawings.
- B. Wood blocking schedule: The following schedule lists common items for which blocking is required and may not be indicated on the Drawings. It is not the intention of this schedule to list all conditions requiring blocking or limit the extent of blocking required for completion of the Work; provide all wood blocking, edgings, nailers, required for receipt of various finishes and surfacing materials. Securely anchor wood blocking and run continuous between framing.
1. Blocking sizes indicated below are minimum sizes for conditions which not otherwise sized or keyed on Drawings. In case of conflict, sizes identified on Drawings govern.

Items	Nominal size of blocking with fastener notes
Millwork;	2 inch by width required to suit field conditions
Cubicle curtain;	2 by 6 inch
Door frames, having openings exceeding 4 feet in width;	2 by 4 inch, full height of wall framing
Door frames, cross corridors;	2 by 4 inch
Door stops, wall mounted;	1 by 3 inch
Platform curtain and valence:	2 by 4 inch

Prefabricated display cases:	2 by 4 inch
Toilet compartments:	2 by 4 inch
Folding panel partitions:	2 by 4 inch
Lockers and bases:	2 by 4 inch
Appliances:	2 by 4 inch
Projector screens:	2 by 4 inch
Laboratory equipment (goggle cabinets, etc.):	2 by 4 inch
Stage curtains:	2 by 4 inch
Casework:	2 by 4 inch
Grab bars;	2 by 6 inch, with 1/4 inch dia. toggle bolts
Lavatories;	3/4 inch plywood extending full height from floor to top of wall framing. Install lavatories with 1/4 inch dia. toggle bolts
Markerboards and display cases;	2 by 4 inch
Mirrors, framed;	2 by 4 inch
Soap dispensers, wall mounted;	1 by 3 inch
Paper towel dispensers, waste receptacles, feminine napkin dispensers;	1 by 3 inch
Toilet paper dispensers;	2 by 4 inch
Wall mounted railings;	2 by 8 inch
Shower seats;	2 by 6 inch
Roof access ladders;	2 by 8 inch
Window treatment:	2 by 4 inch

End of Section

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Section 06 16 00
SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install exterior sheathing board.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 04 20 00 - UNIT MASONRY: Installation of metal masonry ties.
- F. Section 05 40 00 - COLD-FORMED METAL FRAMING: Load bearing curtain wall framing.
- G. Division 09 – FINISHES: Related work specified elsewhere.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 646 - Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gage Steel Studs.

2. ASTM C 1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
3. GA 201 - Gypsum Board for Walls and Ceilings.
4. All applicable federal, state and municipal codes, laws and regulations for fire rated assemblies.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY
- C. Scheduling:
 1. Do not install sheathing until all pipes, ducts, conduits, and other such items which are to be enclosed thereby, have been permanently installed, inspected and approved.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 2. Shop drawings: Details of any special conditions associated with fireproofing.
 3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.

- e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.
- f. Provide letters by manufacturers that state their material is compatible with adjacent materials they will be in contact with.
- g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.6 QUALITY ASSURANCE

- A. Applicator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.7 MOCK-UP

- A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.8 DELIVER, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - a. Neatly stack board materials flat to prevent sagging.

1.9 ENVIRONMENTAL CONDITIONS

- A. In accordance with GA 216, maintain minimum ambient temperature of 50 degrees Fahrenheit 48 hours before, during taping and compounding, and until completely dry thereafter.

1.10 WARRANTY

- A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Sheathing manufacturer's 6 month warranty for coverage against in-place exposure damage. Warranty shall commence on date of material purchase.
 - 2. Sheathing manufacturer's 5 year limited warranty covering materials commencing on date of Project Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Georgia Pacific Corporation, Gypsum Division, Atlanta GA., product "DensGlass".
 2. United States Gypsum Company, Chicago IL. (USG), product "Securock Glass-Mat".
 3. National Gypsum Company, Gold Bond Products Division, Charlotte NC. (Gold Bond), product "e²XP Sheathing".

2.2 SHEATHING BOARD

- A. Sheathing Board 1/2 inch thick and 5/8" thick at fire rated walls gypsum sheathing board complying with ASTM C 1177 with fiberglass mat surface front and back with silicone-treated gypsum core conforming with the following requirements:

Properties	Test	Results
Surfacing:		Glass mat
Width:		4'-0" nominal
Length:		10'-0" (+/- 1/4 inch) maximum
Flexural Strength, lb/ft parallel (4'-0" weak direction):	ASTM C 473	80 pounds
Humidity Deflection, (inches):	ASTM C 473	1/4 inch, maximum
Linear Expansion with Change Moisture (in/in % RH):	ASTM C 518	6.25 x 10 ⁻⁶ , maximum
Thermal resistance "R" (in/ft ² °F/Btu):	ASTM C 518	0.45, minimum
Weight (per 1,000 sq ft):	ASTM C 1177	1,900 pounds minimum
Bending Radius	ASTM C 1177	6 feet, minimum
Mold growth:	ASTM D 3273	Score 10 with no mold detected
Racking Strength, lbs/ft, dry (ultimate):	ASTM E 72	>540 pounds per foot
Surface burning characteristics:	ASTM E 84	Flame spread: 10, maximum
Permeance (ng/Pa•s•m ²):	ASTM E 96 (dry cup method)	23 perms, maximum
Combustibility:	ASTM E 136	Noncombustible
Coefficient of Thermal Expansion (in/in/°F):	ASTM E 228 modified	8.5 x 10 ⁻⁶ , maximum

2.3 ACCESSORIES

- A. Fasteners: Type S-12 fine thread rust resistant 1 inch [25mm] long self-drilling screws, for applying single layer sheathing board to light gage metal framing.
- B. Joint Tape: Self-adhesive, 2 inch wide fiberglass mesh tape compatible with sheathing.
 - 1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein manufacturers offering similar products include the following, or approved equal:
 - a. Dura-Tape International, Union NJ, product "Dura-Tape Fiberglass Mesh Tape".
 - b. Westpac Materials, Orange, CA, product "Self-Adhesive Fiberglass Mesh Tape".
 - c. Grabber Construction Products, Alpine, UT, product "Grabber Mesh Tape GMT200 Series".
- C. Joint Sealer: One-part low modulus, neutral curing, RTV, silicone rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 50, Use NT, G, A and O with a minimum movement capability of +50 percent and -50 percent, equal to the following:
 - 1. Dow Corning, product, "795".
 - 2. Sika, product "Sikasil WS-296".
 - 3. Tremco, product "Spectrem 2".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that all items which are to be enclosed by Work of this Section, have been permanently installed, inspected and approved.
- B. Inspect framing and other substrates; verify that they are in proper condition to receive the work of this Section.
 - 1. Verify that surface of framing and furring members to receive sheathing does not vary more than 1/4 inch from the placement of faces of adjacent members.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 INSTALLATION SHEATHING

- A. Install sheathing in strict compliance with manufacturer's recommended installation instructions and as specified herein, comply with all applicable code requirements.
 - 1. Install specified control joints where indicated on Drawings. Run vertical control joints continuously to top of wall.
 - 2. Comply with Georgia Pacific "Method #1" installation with sealant or equal from approved manufacturer.

- B. Secure sheathing with long dimension perpendicular to wall studs with ends over firm bearing, stagger joints where possible. Use maximum lengths possible to minimize number of joints.
 - 1. For metal framing: Install screws with 8 inch on center spacing 1/2 inch in from edge around perimeter of each sheathing board, and 8 inches on center in field.
 - 2. Drive fasteners tight and flush with surface of sheathing, do not countersink.
 - 3. Locate fasteners minimum 1/2 inch from edges and ends of sheathing panels
 - 4. Drive fasteners tight and flush with surface of sheathing, do not countersink.

- C. Apply self-adhering tape to all joints corners and openings. Apply 3/8 inch (minimum) bead of joint sealant in joints and over fasteners and trowel smooth. Use backing rod at all joints over 1/8 inch.
 - 1. Apply specified joint tape over sealant joints, after Architect's observation of sealant joints.

3.3 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris and scraps.

End of Section

Section 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
1. Interior standing and running wood trim including miscellaneous moldings, trim and sills to receive painted finish where indicated on Drawings.
 2. Treads, risers, nosings and related trim at Auditorium Stage.
 3. Adjustable wall mounted shelving with standards and brackets.
 4. Storage and closet shelving, coat rods and related hardware.
 5. Built in place display cases and glazing for display cases unless noted otherwise.
 6. Stage finish flooring.
 - a. Prefabricated vented base at stage flooring perimeter.
- B. Install the following furnished under the designated Sections:
1. Wood items having transparent finish furnished under Section 06 40 00 – ARCHITECTURAL WOODWORK and installed under this Section 06 20 00 – FINISH CARPENTRY including but not limited to:
 - a. Interior standing and running hardwood trim including miscellaneous moldings, trim and sills where indicated on Drawings.
 - b. Wood stair risers and treads with transparent finish.
 - c. Treads, risers, nosings and related trim at Auditorium Stage with transparent finish.
 2. Plastic laminated shelves (for wall mounted adjustable shelving) furnished by Section 06 40 00 - ARCHITECTURAL WOODWORK.
 3. Plastic laminated wall panel system furnished by Section 06 40 00 - ARCHITECTURAL WOODWORK.
 4. Steel doors furnished by Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.
 5. Wood doors furnished by Section 08 14 16 - FLUSH WOOD DOORS.
 6. Door hardware, thresholds, weatherstripping, seals and gaskets furnished by Section 08 71 00 - DOOR HARDWARE.
- C. No attempt is made in this Section to list all elements of finish carpentry required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any

alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, curbs, nailers, and backer boards.
- F. Section 06 40 00 - ARCHITECTURAL WOODWORK: Casework, countertops, and shop finished millwork to be installed under this Section 06 20 00.
- G. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Furnishing hollow metal doors.
- H. Section 08 14 16 - FLUSH WOOD DOORS: Furnishing wood doors.
- I. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware, weatherstripping, thresholds, seals and gaskets for installation under this Section 06 20 00.
- J. Section 09 91 00 - PAINTING: Field applied opaque primer (excluding backpriming) and finish coatings. Fill all fastener holes.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A250.11 (formerly SDI 105) - Recommended Erection Instructions for Steel Doors and Frames.
 - 2. AWI Quality Standards, Eighth edition, for the following sections.
 - a. AWI Section 100: Lumber.
 - b. AWI Section 200: Panel Products.
 - c. AWI Section 300: Standing and Running Trim (Interior and Exterior).

- d. AWI Section 500: Paneling.
- e. AWI Section 600: Closet and Storage Shelving.
- f. AWI Section 1700: Installation.
3. APA - applicable grades and specifications.
4. PS-1 - Construction and Industrial Plywood.
5. PS-20 - American Softwood Lumber Standard.
6. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
7. SPIB Grading Rules, current edition.
8. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber.
9. American Lumber Standards Committee, National Lumber Grades Authority for Canadian Lumber, and applicable grading rules and standards of the various lumber associations whose species are being used for grades specified.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, installation instructions for hardware, adhesives and accessories furnished hereunder.
 2. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 - a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards.
 - 1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor's chain of custody number and identify each chain of custody certified product on a line-item basis. A "vendor" is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
 - b. Composite Wood and Agrifiber Products: Include certification indicating compliance with the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda for all composite wood and agrifiber products.
 3. Shop drawings:
 - a. Large scale design details, minimum 1-1/2 inch to one foot scale, showing profiles, jointing and fastening methods; and complete installation details.
 - b. Provide full scale drawings of wood trim elements showing all profiles and dimensions.

- c. Provide shop drawings bearing dimensions of actual measurements taken at the project.
- 4. Samples: Provide samples as requested by Architect for selection of colors and finishes.
- 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
 - f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.

1.5 QUALITY ASSURANCE

- A. Quality Standards: All materials and workmanship scheduled to receive transparent finishes shall meet AWI Premium grade quality standards. All other materials and workmanship shall meet AWI Custom grade quality standards.
- B. Install work in accordance with the latest specified AWI quality standards, except that standing and running trim joints shall be field mitered and fitted.
- C. Certifications:
 - 1. All wood products furnished under this Specification Section shall be “FSC Certified” according to the rules of the Forest Stewardship Council (FSC).
 - a. FSC Certification includes the following certification bodies of forests and forest products:
 - 1) SCS Global Services.

- 2) SmartWood.
- 3) SGS Qualifor.
- 4) Soil Association.

- D. Discard lengths of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.

1.6 DELIVERY STORAGE AND HANDLING

- A. Do not deliver interior finish carpentry materials to the project until all concrete, masonry, plaster, and other wet work has been completed and dry.
- B. Ship and handle all materials and fabricated items in a manner which will prevent damage thereto, and store all materials and fabricated items at a dry, elevated, ventilated, and protected interior location maintaining 60 degrees Fahrenheit and a maximum relative humidity of 55 percent.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

PART 2 – PRODUCTS

2.1 WOOD MATERIALS, GENERAL

- A. General: Materials, as fabricated and installed, shall comply with specified grades of the latest addition AWI Quality Standards.
- B. Sustainable Forest Certification: All wood shall be “Chain-of-Custody” certified as FSC Certified.
- C. Moisture content:
1. Wood for interior use shall have a moisture content between 5 and 10 percent, when delivered to the project.

2.2 BOARD AND PANEL MATERIALS

- A. Interior trim to receive paint (opaque finish): Wood shall be clear without knots or surface defects. and conform to AWI/AWMAC/WI “Architectural Woodwork Standards,” latest edition for specified quality grades, (as installed). Acceptable wood species are limited to the following:
1. Yellow Poplar (Liriodendron tulipifera), Plain Sawn, clear straight-grained, C-Select or better.
 2. Natural Birch” Yellow Birch (Betula alleghaniensis), Plain Sawn.
 3. Natural Maple (Acer saccharum), Plain Sawn.
- B. All interior wood scheduled to receive transparent finish shall be furnished under Section 06 40 00 and installed under this Section 06 20 00.

- C. Plywood and panel products:
 - 1. Shelving to receive paint: 3/4 inch thick Birch veneer plywood (AA) with 3/8 inch hardwood edge banding at all edges.
 - 2. Engineered panels scheduled for painted finish: Medium Density Fiberboard (MDF) of thickness indicated on the Drawings, conforming to ANSI A208.2 product class MD, fabricated from 100 percent recycled fiber, using formaldehyde free synthetic resin such as methyl diisocyanate (MDI), having a minimum density of 45 pounds per cubic foot (769 kg/m³).
 - a. Flakeboard, Toronto, Ontario, Canada, product: "Superior MDF".
 - b. SierrePine Inc., Moncure, NC, product "Medite II".
 - c. Plum Creek Timber Company Inc., Seattle, WA, product "Standard MDF".
 - 3. Particle board: Mattformed three layer medium density wood particle panel, general use grade per ANSI A 208.1 with an minimum density of 48 pounds per cubic foot, fabricated using formaldehyde free synthetic resin such as Rodman Industries, Oconomowoc, WI product: "Rodman Resincore I" or approved equal.
- D. Stage finish flooring: Double (service) tempered hardboard fabricated from inter-felted lingo-cellulosic fibers consolidated under heat and pressure complying with ANSI A135.4, urea-formaldehyde free and biodegradable, minimum 1/4 inch thick fabricated in sheets 4 feet by 8 feet factory primed and finished.
 - 1. Provide products complying with the following minimum characteristics:
 - a. Density: 58 lbs/ft³ when testing in accordance with ASTM D 1037.
 - b. Modulus of rupture: 5,000 lbs/in² when testing in accordance with ASTM D 1037.
 - c. Water absorption: 28 percent when testing in accordance with ASTM D 1037.
 - d. Provide one sanded face, smooth and grainless.
 - 2. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Georgia Pacific Building Products, Atlanta, GA.
 - b. Decorative Panels International, Toledo, OH.
 - 3. Vapor retarder: 6 mil thick black polyethylene sheeting and 2 inch wide waterproof sealing tape for joints.
 - 4. Plywood subflooring: Refer to Section 06 10 00 – ROUGH CARPENTRY.
 - 5. Vented base: Vented molded rubber cover base, 4 by 3 inches with premolded outside corners as supplied by manufacturer
- E. Provide other finish carpentry products, not specifically described, but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.3 DISPLAY CASES

- A. Frames:

1. Furnished by Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES.
 2. Furnished by Section 08 12 16 – ALUMINUM FRAMES.
- B. Tempered glass for display case doors and shelves: 3/8 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z 97.1. Provide certification to Architect that glass complies with the specifications, do not label glass, provide polished edges.
1. Setting blocks: Neoprene, 80-90 shore A durometer hardness; sized as follows:
 - a. Length: 0.1 inch per square foot of glass, but not less than 4 inches.
 - b. Width: equal to glazing rabbet space minus 1/16 inch.
 - c. Height to suit glazing method and pane weight and area.
- C. Shelf supports:
1. Brackets: Extruded aluminum, rectangular bar type brackets with concealed locking system and anodized finish, 1/4 inch thick by 2 inches high by length required to suit shelf depth equal to Rakks/Rangine Corporation, Needham, MA, product "BR Series".
 2. Standards: Extruded 6063-T6 aluminum "C" style standards with flanges designed to cover edge of drywall opening designed to accept specified brackets with anodized finish, nominal 3/4 inch width by 5/8 inch depth equal to Rakks/Rangine Corporation, Needham, MA, product "E Series".
- D. Sliding door track:
1. Hardware: Extruded aluminum bottom rail, shoe, tracks with nylon rollers designed to accommodate glass doors equal to A. Geo. Diack, City of Industry, CA, product "2300 Sliding Aluminum Track Assembly".
- E. Wall panels:
1. Acoustical panels: High density, non-perforated mineral board core panels 5/8 inch thick with fabric finish equal to Conwed Designscape, Ladysmith, WI, product "Respond TK-AC".
 - a. Fabric Facing
 - 1) General: All fabric shall be in compliance with local and State fire regulations. Flame resistant treatment shall be applied to back of fabric only.
 - 2) Provide fabric equal to Guilford of Maine, Wellington Contract Fabrics, or Architect approved equal.
 - a) Content: 100 percent olefin.
 - b) Minimum weight: 17 ounces per linear foot.
 - c) Width: 54 inches.
 - d) Color and pattern: As selected by the Architect.
- F. Locks for sliding glass doors: Equal to Hafele Sliding Door Lock No. 234.55.209.
- 2.4 CLOSET AND SHELVING HARDWARE
- A. Metal closet rods and brackets:

1. Closet pole: 0.087 inch (2.21 mm) wall thickness steel tubing, 1-1/16 inch diameter, of custom cut lengths required for full width of closet, chrome finish.
 - a. Provide intermediate supports for span lengths greater than 48 inches.
 - B. Adjustable shelving, wall mounted standards and brackets:
 1. Acceptable manufacturers, include but are not limited to the following:
 - a. Spur Systems International Limited.
 - b. Knappe & Vogt, Grand Rapids MI.
 2. Standards (uprights): 14 gage double tracked uprights, in epoxy powder-coat finish, color as selected by Architect from manufacturer's full range of colors.
 - a. Locate uprights no greater than 24 inches on center.
 3. Brackets: 14 gage formed brackets, color and finish matching standards,
 - a. Depth (typical): 270mm (10-1/2 inch depth), or as otherwise indicated on Drawings.
- 2.5 PLATFORM TREADS AND RISERS
- A. Transparent Finished Lumber/Solid Hardwood: Hard Maple (*Acer saccharum*) "Select White" (sapwood), Plain-sliced, Grade FAS (1) or better, air dried and kiln dried to a 6 percent moisture content, then tempered to 7-8 percent prior to fabrication. White Maple lumber exposed to view, shall be free of stains, splits, shakes, season checks and other similar defects
- 2.6 ACCESSORIES AND HARDWARE
- A. Glue for lamination and fabrication of wood, plywood and particle board items: Exterior Grade, phenolic resin glue.
 - B. Nails for interior trim items: 6d and 8d coated or galvanized finish nails, except as otherwise specified herein.
 - C. Screws: Flat-head wood screws of the appropriate sizes, galvanized finish for interior use.
 - D. Bolts, nuts, washers, blind fasteners, lags: Galvanized, of size and type to suite application as indicated in the drawings.
 - E. Paint for back-priming:
 1. California: "Trouble Shooter Acrylic Latex Primer", N°. 45100
 2. ICI / Dulux: Ultra Hide N°. 2010-1200 Acrylic Primecoat.
 3. Moore: "Moore Fresh Start", N°. 023
 4. Pittsburgh: "Sun-Proof Exterior House & Trim Latex Wood Primer", 72-1 Series
 5. Sherwin-Williams: "A100 Exterior Latex Wood Primer", N°. B42W41

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of blocking, backing and support framing for all finish carpentry work.
- B. Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

- A. Prime all wood surfaces of items or assemblies to be in contact with cementitious and masonry materials, prior to installation.

3.3 INSTALLATION – GENERAL CARPENTRY

- A. Comply with installation requirements of AWI (Architectural Woodwork Institute) Quality Standards, Eighth edition for Premium Grade quality work.
- B. Dress and sand woodwork until free from machine and tool marks, abrasions, raised grain, or other defects that will show through the finish on surfaces exposed to view. Wherever possible, carry out sanding on a shop belt sander, not in the field. Sandpaper field joints and leave in perfect condition for finishing.
- C. Make all joints tight, and form to conceal shrinkage. Glue all miters having a dimension of 4 inches or more from heel to point. Joints shall be glued tight and so formed as to conceal shrinkage. Cope trim at returns and miter at corners to produce tight-fitting joints with full surface contact throughout length of joint.
- D. Make a minimum of splices and joints in running trim, and where such splices and joints occur, fasten securely, with all exposed surfaces having smooth, continuous planes. Stagger joints in adjacent or relate members. Use scarf joints for end-to-end joints.
- E. Scribe and cut work to fit adjoining work closely. Refinish cut surfaces in prefinished items.
- F. All nails in interior finished work shall be blind nailed wherever possible. Nail trim with finish nails only, set using appropriate nailpunch and fill with matching wood filler. Sand smooth wood filler. Do not fasten trim with screws or bolts unless otherwise directed, or is to be subsequently covered with smaller trim.
- G. Woodwork shall be properly framed, closely fitted and accurately set to the required lines and levels and shall be rigidly secured in place. Shim as required using concealed shims to achieve specified tolerances.
- H. Cover exposed edges of plywood shelving with 3/8 inch hardwood edging. Width of edging to match thickness of shelving.

3.4 INSTALLATION - PREFABRICATED PRODUCTS INSTALLED UNDER THIS SECTION

- A. Do not commence installation of products until immediately adjacent surfaces have been completely installed and finished.

- B. Perform installation work in accordance with the approved shop drawings and the manufacturer's installation instructions.
- C. Install products absolutely level and in true line, with units securely anchored to the surrounding construction.
- D. Remove all tape and other packing materials; thoroughly clean and polish all exterior and interior surfaces.
- E. Touch-up all scratches and other surface defects, using same materials and colors as shop finish.

3.5 INSTALLATION - DOORS AND HARDWARE

- A. Install doors in accordance with the manufacturer's recommendations, ANSI/SDI-100, ANSI A250.11, and the Door Hardware Institute recommendations.
- B. Install hardware in accordance with manufacturer's instructions and requirements of referenced organizations, and the requirements of Section 08 71 00 - DOOR HARDWARE.
 - 1. Use the templates provided by hardware item manufacturer.
 - 2. Mount hardware units at heights indicated in the following applicable publications, except as specifically indicated or required to comply with the governing regulations.
 - a. Conform to ANSI 117.1 for positioning requirements for the handicapped.
 - b. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute (DHI.)
 - c. WDMA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors".
 - 3. Installation of hardware shall comply with NFPA 80 and NFPA 101 requirements
 - 4. Prefit hardware before finish is applied, remove and reinstall after finish is completed. Install hardware so that parts operate smoothly, close tightly and do not rattle.
 - 5. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- C. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant, forming tight seal between threshold and surface to which set. Securely and permanently anchor thresholds, using countersunk non-ferrous screws to match color of thresholds (stainless steel screws at aluminum thresholds).
- D. Tools for maintenance: All special tools packaged with hardware items shall be saved, tagged/identified as to product use, and turned over to the Owner upon completion of the Work.
- E. Clean adjacent surfaces soiled by hardware installation.

- F. Prior to Final Inspection make final check and adjustment of all hardware, clean operating items as necessary to restore proper function and finish of hardware.

3.6 TOLERANCES

- A. Maximum variation for woodwork from true position of 1/8 inch in 8 feet for plumb and level and with a maximum of 1/16 inch offsets in adjoining surfaces intended to be flush.
- B. Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

3.7 ADJUSTING

- A. Adjust display case doors for smooth and balanced movement.

3.8 CLEANING

- A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
- B. Daily clean work areas by sweeping and disposing of scraps and sawdust.
- C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- D. Remove protective material from pre-finished surfaces.

3.9 PROTECTION

- A. During the operation of finish carpentry, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.
- B. Following installation, protect all work of this contractor from possible damage by other trades. Include protection of countertops, cabinets, display cases, and all other finished work that is susceptible to damage.

End of Section

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Section 06 20 14
EXTERIOR WOOD SEATING

PART 1 GENERAL

1.0 GENERAL PROVISIONS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:
01 30 00 – SUBMITTALS
01 43 39 – MOCK-UPS
01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
01 40 00 – QUALITY REQUIREMENTS; Testing and inspection.

1.1 DESCRIPTION OF WORK

- A. Provide all equipment and materials, and do all work necessary to furnish and install the custom wood seating consisting of wood seating with steel supports and brackets, fastened to concrete site wall, as indicated on the Drawings and as specified herein.

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
1. Section 03 45 01, PRECAST ARCHITECTURAL CONCRETE - SITEWORK
 2. Section 05 50 00, METAL FABRICATIONS

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
1. American Society for Testing and Materials (ASTM):

A 153	Zinc - Coating (Hot-Dip) on Iron and Steel Hardware
A 325	High Strength Bolts for Structural Steel Joints
A 366	Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

D 245

Structural Grades and Related Allowable
Properties for Visually Graded Lumber

1.4 QUALITY ASSURANCE

- A. Materials and workmanship shall conform to governing laws and building code.
- B. Lumber shall bear the grade-trademark of the association under the rules or standards of which they were produced. Grade trademarks shall conform to the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 - 1. Grades specified are the minimum acceptable. Lumber grades shall be determined in accordance with ASTM D 245.
 - 2. Lumber shall bear the grade mark of an American Lumber Standards Committee Board of Review-approved agency. Lumber shall conform to USDC PS 20.
 - 3. Lumber shall bear a mark of mill identification.
- C. Wood shall be Forest-Safe™, indicating that the supplier buys only from those mills whose forestry practices have been independently certified to conform to the most rigorous standards as set by the Forest Stewardship Council (FSC).
 - 1. Furnish evidence indicating that source of wood used for bench construction is a plantation farm or other designated source practicing sustain yield concept in forestry, and regulated by governing authorities regarding the growing, harvesting, and replanting of tropical hardwood trees.
 - a. All lumber shall come stamped with the mills Forest Stewardship Council (FSC) chain-of-custody certification number, which allows it to be traced back to the originating well-managed forest.

1.5 SUBMITTALS

- A. Submit shop drawings indicating profiles, sizes, connection attachments, and types of fasteners.
- B. Product Data: Submit product data to Architect for approval, consisting of complete manufacturers product description and specifications.
- C. Furnish evidence indicating that source of wood used for bench construction is a plantation farm or other designated source practicing sustain yield concept in forestry, and regulated by governing authorities regarding the growing, harvesting, and replanting of tropical hardwood trees.
- D. Verification samples: submit a minimum of two 2" x 6" x 1'-6" seating board samples of material to be exposed in the finished work showing full range of color and finish variations expected.

1.6 COORDINATION

- A. Work under this section shall be properly coordinated with the work of other sections to assure the steady progress of all the work of the Contract.

1.7 PRODUCT DELIVERY AND STORAGE

- A. Materials when delivered to site shall be stacked and stored above the ground under protective coverings or indoors in such manner as to insure proper drainage, ventilation, and protection.
- B. Wood seating materials shall be stored on elevated piles to allow for air circulation below and tipped in one direction to effectively drain moisture. Lumber shall be wrapped completely, including bottoms, in waterproof tarps. Tarps shall be tied down to protect against wind blow-off. Should delays in Project be anticipated, lumber shall be stored in covered storage.

PART 2 - PRODUCTS

2.0 LUMBER

- A. Lumber shall be of sound stock, new, straight, of consistent size, free of stains and mildew, and kiln dried to a moisture content of not more than 19%, by weight. Wood members shall be selected for best possible appearance from the grade of stock specified.
1. Custom Wood Seating shall be "Ipe", Species: Tabebuia spp. Lapacho Group; Family: Bignoniaceae, supplied FEQ-Clear All Heart, S4S-E4E (surfaced four sides-eased four edges), with smooth surface profile. Edges shall be eased to a radius of 1/8 in. All lumber shall be supplied 2 in. over the specified length to allow for final trim and proper fit in the field. Lumber shall be supplied with the end sealed with Mobil CER-M, or approved equal aqueous wax log end sealer.
 2. Moisture Content: Partially kiln or air-dried to a moisture content of 15% - 19%.
 3. Lumber Grade: Lumber shall be graded as per "Premium Select Architectural Grade" as follows:
 - a. Lumber shall be graded both faces and both edges.
 - b. Lumber shall be straight grained and parallel cut without heart center.
 - c. Lumber shall be all heartwood, no sapwood allowed.
 - d. Lumber shall be in sound condition, free from worm holes or knots.
 - e. Allowable imperfections defined as Small drying cracks, small end splits (less than 5/32 in. in width), that do not impair strength of the material or fastening. Discoloration caused by weathering or chemical reaction. Bow or twist which can be removed using normal installation methods and tools.

- f. Not Allowable Imperfections defined as sapwood, hard sapwood, soft sapwood, splits, end splits, ring shades, longitudinal heart cracks, internal cracks, fungi affects - (blue to gray, brown to red, white to yellow, or incipient decay). Bow or twist which cannot be removed using normal installation methods and tools.
- g. Minimum eight (8) foot lengths: minimum twenty five percent (25%) twelve (12) foot lengths, minimum ten percent (10%) sixteen (16) foot lengths
- h. Boards: as shown on drawings, boards to be:
 - a. 2" x 6"
 - b. 2" x 8"
 - c. 5/4" x 6"

2.1 SEATING HARDWARE

- A. Refer to Section 05 50 00, METAL FABRICATIONS for stainless steel brackets and supports.
- B. Provide stainless steel hardware as indicated in the drawings, required to complete this work, and to attach this work in a secure and rigid manner to work of this and other trades, including all brackets, sleepers, anchors, anchor bolts, thru bolts, washers, nuts, nails, and other hardware. Assist other trades as necessary in the placement of brackets and anchor bolts in concrete and furnish full instructions regarding locations, sizes, and other requirements of the items in order that they may properly prepare their work to receive same. Rough hardware shall comply in all respects with requirements of the governing laws and codes.
- C. Fastening screws for seating shall be Simpson Swan self-drilling #7 trim head stainless steel screws (1-800-847-4714), or approved equal.

2.2 SEALER

- A. Sealer shall be a blend of superb-grade linseed oil, long-oil alkyds and pure South American tung oil, including complex translucent iron oxide pigments as UV inhibitors, similar to Australian Timber Oil, manufactured by Cabot, 100 Hale Street, Newburyport, MA 01950; Technical Hotline within the US and Canada 1-800-US-STAIN

2.3 BUILDING FELT AND PROTECTIVE PAPER

- A. Building felt for general use where freedom from staining is non-essential shall be 15 lb. asphalt-saturated felt conforming to ASTM D 226, Type I.

PART 3 - EXECUTION

3.0 WOOD SEATING

- A. The Contractor shall be responsible for structural integrity, connections, and anchorage of wood seating.
- B. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, or not adequately seasoned. Structural members shall be full-length without splices.

3.1 FASTENING OF WOOD MEMBERS

- A. Steel brackets shall be bolted to concrete seatwall with stainless steel epoxy anchors or equal as indicated on the Drawings.
- B. Wood seating shall be secured to steel supports by means of countersunk stainless steel screws as indicated on the Drawings.
- C. Wood boards to be fastened to stainless steel sleepers from below then the assembly is to be placed on the precast bench. Once properly aligned the wood top is to be drilled to allow a tapcon or similar anchor to secure the assembly to the concrete base. The drill hole should then be plugged with a matching ipe wood plug.

3.2 SEALER

- A. Wood seating shall be sealed in accordance with manufacturer's printed instructions.

3.3 CLEANING

- A. Upon completion of wood seating work in any given area, remove all rubbish and debris from the work area and leave in clean condition.

END OF SECTION

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Section 06 40 00
ARCHITECTURAL WOODWORK

PART 1 - GENERAL

- A. Furnish and install the following architectural woodwork items:
1. Plastic laminated countertops.
 2. Plastic laminate clad millwork.
 3. Exposed blocking and blocking concealed by the work of this Section required for the installation of architectural woodwork.
 4. PVC edging of plastic laminate at edges of doors, drawer fronts, millwork fronts, countertops and shelving.
 5. Hardware for work of this Section.
 6. Plastic laminate wall panel system at Auditorium and Lobby.
 7. Custom millwork including but not limited to:
 - a. Main Administration reception counter and cabinetry.
 - b. Mail/Copy Room mailboxes.
 - c. Media Center circulation desk.
 - d. Reception Desk and display case at Andy's Attic B011.
 - e. Transaction Counter at Client B027.
 - f. Auditorium Control Booth counter and cabinetry.
 - g. Cubbies.
 - h. Hinged closure panels at glass panel folding door stack pocket.
 8. Shelving at Andy's Attic.
 9. Countertop support brackets, same as 12 30 00.
 10. Double acting hinge for swinging gate at general office Bommer or equal, US26D finish, 3" medium duty, qty. 2 hinges, up to 70lb capacity.
 11. Display case glazing unless otherwise noted in Section 08 80 00 – GLAZING.
 12. Composite metal panel/plastic laminate acoustical wall panel system at Auditorium.
- B. Furnish the following products to be installed under the designated Sections:
1. Plastic laminate shelves (for wall mounted adjustable shelving) for installation under Section 06 20 00 - FINISH CARPENTRY.
 2. Plastic laminate wall panel system for installation under Section 06 20 00 - FINISH CARPENTRY.
 3. Shop-milled and shop-finished wood elements designated for transparent finish to Section 06 20 00 – FINISH CARPENTRY for field installation including but not limited to the following:
 - a. Interior standing and running hardwood trim including miscellaneous moldings, trim and sills where indicated on Drawings.
 - b. Wood stair risers and treads with transparent finish.
 - c. Treads, risers, nosings and related trim at Auditorium Stage with transparent finish.

- d. No attempt is made in this Section to list all wood elements and products to receive a transparent finish. This Section 06 40 00 shall provide all miscellaneous wood trim, panels and other exposed-to-view woodwork and millwork scheduled or otherwise indicated to receive a transparent finish, excluding flush wood doors specified under Section 08 14 16.
- C. Install the following products furnished under the designated Sections:
 - 1. Composite metal panels for acoustical wall panel system at Auditorium furnished under Section 07 42 43 – COMPOSITE WALL PANELS.
 - 2. Pencil grilles furnished under Section 12 30 00 – CASEWORK or Section 12 35 53 - LABORATORY CASEWORK AS APPLICABLE.
- D. Make all cut-outs within millwork items as required to accommodate sinks, piping, conduit, and other mechanical and electrical work, from templates provided by the respective mechanical and electrical trades.
- E. No attempt is made in this Section to list all elements of architectural woodwork required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.
- F. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Concealed wood blocking and nailers.
- F. Section 06 20 00 - FINISH CARPENTRY: Installation of items furnished under this Section.

- G. Section 06 61 16 - SOLID SURFACING FABRICATIONS:
 - 1. Solid surfacing material countertops.
 - 2. Fabricated solid polymer trim at plastic laminate counters, and where shown on the Drawings.
- H. Section 07 42 43 – COMPOSITE WALL PANELS: Furnishing ACM panels for installation at Auditorium acoustical wall panel system installed by this Section 06 40 00.
- I. Section 08 80 00 - GLAZING: Glass doors, shelving and associated hardware.
- J. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Metal framing for drywall construction work.
- K. Section 09 29 00 - GYPSUM BOARD: Wallboard construction work, having taped and compounded joint finish.
- L. Section 09 64 29 – WOOD STRIP AND PLANK FLOORING: Wood flooring.
- M. Division 22 - PLUMBING: Plumbing fixtures and piping.
- N. Division 26 - ELECTRICAL: Electrical connections for lighting and data/power outlets.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - References. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D 523 - Standard Specification for Specular Gloss.
 - 2. AWI (Architectural Woodwork Institute) Architectural Woodwork Standards.
 - 3. APA Grades and Specifications.
 - 4. National Lumber Grades Authority, American Lumber Standards, and Grading Rules and Standards of the various lumber associations whose species are being used, with grade-marks for same.
 - 5. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber; and Product Standard (PS):
 - a. PS-1 - Construction and Industrial Plywood Standard.
 - b. PS-20 - American Softwood Lumber Standard.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. At least two weeks before scheduled delivery of woodwork, conduct a pre-installation conference at the Project site. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
 - 1. Required attendees: Architect, Contractor, installers of woodwork, woodwork fabricator representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - a. Section 06 20 00 - FINISH CARPENTRY

- b. Section 09 29 00 - GYPSUM BOARD.
 - c. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES.
 - d. Section 09 91 00 - PAINTING.
 - e. Section 22 00 00 - PLUMBING.
 - f. Section 23 00 00 - HEATING, VENTILATING, AND AIR CONDITIONING.
 - g. Section 26 00 00 - ELECTRICAL.
2. Agenda:
- a. Scheduling of woodwork operations.
 - b. Review of staging, material storage locations and temporary protection of stored items.
 - c. Ambient conditioning and environmental controls.
 - d. Coordination of related work.
 - e. Protection of installed woodwork.
3. Delivery and installation of woodwork may only proceed when everyone concerned agrees that required ambient conditions can be maintained.

B. Sequencing:

- 1. Field Measurements: Where possible the woodwork manufacturer shall take field measurements before preparation of shop drawings and fabrication to ensure proper fitting of Work.
 - a. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
- 2. Field dimensions which are not controlled by Project conditions: The woodwork manufacturer is responsible for details and dimensions not controlled by Project conditions and shall show on his shop drawings all required field measurements beyond his control.
 - a. The Contractor shall acknowledge the woodwork fabricator's need for accurate field dimensions prior to custom fabrication.
 - b. The Contractor and the woodwork manufacturer shall cooperate to establish and maintain these field dimensions.

C. Scheduling:

- 1. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
- 1. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 - a. Urea-formaldehyde Resins: Written documentation certifying that all composite wood and agrifiber products used on this Project contain no added urea-formaldehyde.

- 1) Written certification from Millworker, that only “no added urea-formaldehyde” manufactured composite panel products are incorporated into the Work, including all concealed components. Composite panel products include but are not limited to particle board (PB), Medium Density Fiberboard (MDF) and similar manufactured products.
 - 2) Written certification from Millworker that laminating adhesives used in product fabrication on or off site do not contain any added urea-formaldehyde resins.
2. Shop drawings bearing dimensions of actual measurements taken at the project, include at least the following, which are in addition to shop drawing requirements described in AWI Quality Standards:
 - a. 1/4 inch scale elevations and plans of each millwork item.
 - b. Large scale design details of minimum 1-1/2 inch to 1-foot scale, showing abutting materials, installation conditions, clearances. Show woodwork profiles, jointing and fastening methods; details of drawers and doors.
 - c. Full size or half-full size sections, showing individual components, profiles and jointing.
 3. Selection Samples:
 - a. Plastic laminate chips for initial color selection by Architect.
 - b. Chain of PVC edging materials.
 - c. Provide additional samples as requested by Architect for initial selection of material colors and finishes.
 4. Verification Samples:
 - a. 12 inch long samples of solid hardwoods illustrating maximum range of color variations and applied transparent shop finish.
 - b. 12 by 12 inch samples of plastic laminate (of each color required for project).
 - c. 12 inch length samples of plastic edging material (of each color required for project).
 - d. One each of all cabinet hardware. (approved cabinet hardware samples will be returned to Contractor and may become part of the Work).
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.

1.6 QUALITY ASSURANCE

- A. Quality Standards: All work performed under this Section shall be of quality grades, indicated below, as defined in the referenced AWI “*Architectural Woodwork Standards*”, as modified herein by this Specification Section.
 - 1. All work having a transparent wood finish: Premium grade.
 - 2. All plastic laminated work: Custom grade.
- B. Qualifications:
 - 1. Fabricator/Installer: specializing in architectural woodwork of type specified herein having a minimum of 5 years documented experience.

1.7 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Mockups: Before fabricating and installing interior architectural woodwork, build mockups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be [fabricated] [and] [installed].
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting interior architectural woodwork fabrication.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- C. Locate mock-ups where directed and include all surfaces and materials scheduled to receive a field applied finish.
- D. Accepted mock-ups may [not] remain as part of the work; the number of mock-ups shall not be restricted. Demolish and remove mockups when directed.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. General: The woodwork manufacturer, woodwork installer and the Contractor are jointly responsible to make certain that woodwork is not delivered until the building and storage areas are sufficiently dry so that the woodwork will not be damaged by excessive changes in ambient humidity and relative moisture content.
 - 2. Concrete, masonry, plaster, tile and marble setting and polishing and other wet work shall be completed and dry before delivery, storage and installation of woodwork items.
 - 3. Sequence deliveries to avoid delays and to minimize on-site storage.
- B. Storage and Handling Requirements:
 - 1. Ship and handle all materials and fabricated items in a manner which will prevent damage thereto, and store all materials and fabricated items at a dry, elevated, ventilated, and protected interior location.

1.9 SITE CONDITIONS

- A. Temperature: Maintain ambient temperature above 55 degrees Fahrenheit for 5 calendar days before, and during installation of architectural woodwork; maintain temperature after installation until Owner's Final Acceptance.
- B. Relative Humidity: Maintain a relative humidity between 25 and 55 percent for a minimum period of 5 calendar days before, and during, installation of architectural woodwork: maintain relative humidity after installation until Owner's Final Acceptance.

1.10 WARRANTIES

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- A. General requirements: New, dressed four sides (S4S), and free from warping and other defects.
 - 1. Moisture Content:
 - a. Solid hardwood(s) scheduled for transparent finish: Moisture content shall not exceed 8 percent when delivered to Project.
 - b. Typical (hardwood and softwoods): Moisture content of wood shall be between 5 and 10 percent when delivered to the project.

- B. Exposed wood scheduled for transparent finish: Select Maple (*Acer saccharum*) clear grain.
 - 1. Wood shall color match specified veneer, and be clear without knots, and other natural defects.
- C. Concealed supports for edge and corner backing shall be kiln dried birch or poplar, meeting AWI Premium Grade Standards.
- D. Blocking and furring at base and walls shall comply with American Softwood Lumber Standard PS 20-70 and with specific grading requirements of SPIB: Kiln dried (KD15), Structural Light Framing, N^o. 2 grade, free of warping and large knots.
- E. Internal concealed framing for millwork: Kiln-dried, (KD15), eastern pine, poplar, eastern spruce, or southern pine, conforming to AWI Premium grade.
- F. Fir plywood for concealed from view applications in conjunction with the various millwork items: EWA C-C PLUGGED EXT.

2.2 PLASTIC LAMINATE FACING AND BACKING

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Ralph Wilson Plastics Co. (Wilsonart), Temple TX.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Ralph Wilson Plastics Co. (Wilsonart), Temple TX.
 - 2. Formica Corp., Cincinnati, OH.
 - 3. Laminart, Elk Grove Village, IL.
 - 4. Pioneer Plastics Corp. (Pionite), Auburn ME.
 - 5. Nevamar Corp., Odenton MD.
 - 6. Aborite Corporation, Quebec Canada.
- C. Plastic laminate, general purpose, conforming to NEMA LD3.1 -1991 Grade GP50, nominal 0.050 inch thickness, in a low non-directional texture in color price group selected by the Architect.
 - 1. General purpose grade laminate shall be used for counter tops where indicated on the Drawings.
 - 2. General purpose grade laminate shall be used for all exposed to view surfaces including:
 - a. Exposed outward face of cabinet fronts and closure trim.
 - b. Cabinet doors (all sides).
 - c. Drawer fronts (all sides).
 - d. Interior surfaces of open cabinets (without doors).
 - e. Plastic laminated trim.

- D. Plastic laminate, cabinet interior grade, conforming to NEMA LD3-1985 Grade CL20, 0.020 inch nominal thickness, selected from full range available color price groups by the Architect.
 - 1. Cabinet interior grade laminate may be used for the interior surfaces of all 'closed cabinets' where general purpose grade is not required.
 - 2. All shelving shall be cabinet interior grade.
- E. Plastic laminate, unfinished balancing (backer) sheet, conforming to NEMA LD3-1985 undecorated laminate, Grade BK20, 0.020 inch nominal thickness.
- F. PVC Edging for plastic laminate millwork, including but not limited to countertops:
 - 1. Manufactured by EdgeCo, Dolken Woodtape, Charter, or equal. Edging shall be 3 mm thick solid edge banding.
 - 2. Edges: Square.
 - 3. Custom colors to match plastic laminate colors.
 - 4. Seal all edges not schedule to receive plastic laminate or edge banding.

2.3 BACKING FOR LAMINATES

- A. Doors, drawer fronts, end panels extending to floor and all countertops with sinks and similar wet conditions: Moisture resistant medium density fiberboard (MDF) conforming to ANSI A208.2 product class MD, fabricated from 100 percent pre-consumer recycled fiber, using formaldehyde free polyurethane/synthetic resin such as methyl diisocyanate (MDI) or (pMDI), having a minimum density of 44 pounds per cubic foot.
 - 1. Acceptable products include the following:
 - a. SierrePine Inc., Moncure, NC, product "Medex" or approved equal.
 - 2. Thicknesses:
 - a. Typical: 3/4 inch thick panels, except as otherwise indicated.
 - b. Wall panels: 1 inch thick panels, except as otherwise indicated.
- B. Wall panels: Class A and Class C mattformed three layer medium density fiberboard graded M2 per ANSI A 208.1 with a minimum density of 48 pounds per cubic foot or equivalent hardwood plugged plywood complying with PS 51-71.
 - 1. Thickness: 3/4 inch thick unless otherwise indicated on the Drawings.
 - 2. Reveal: 1/4 inch plastic laminate veneered plywood. Back of plywood reveal to be sealed with plastic laminate liner.
 - 3. Tape: Provide double-sided, solvent-free acrylic adhesive on back on reveal equal to 3M "Double Coated Tape 9832".
 - a. Tape to cover minimum 80 percent of back of plywood reveal.
- C. Cabinetry case body, and countertops without sinks: Mattformed three layer medium density fiberboard graded M2 per ANSI A 208.1 with a minimum density of 48 pounds per cubic foot or equivalent hardwood plugged plywood complying with PS 51-71.
 - 1. "FSC:" Provide board which is comprised of 75 percent FSC certified wood equal to the following:

- a. Collins Pine Company (distributed through Panel Source International, Tacoma, WA) product: "FSC Certified Particleboard."
2. Thicknesses:
 - a. 3/4 inch thick at cases.
 - b. 1 1/8 inch thick at counters without sinks.

2.4 GLASS AND GLAZING MATERIALS

- A. Tempered glass for shelving: 3/8 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z 97.1.
 1. Provide certification to Architect that glass complies with the specifications, do not label glass, provide polished edges.
- B. Tempered glass for millwork doors: 3/8 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z 97.1.
 1. Provide certification to Architect that glass complies with the specifications, do not label glass, provide polished edges.
- C. Glazing channels at B171 Security Office: Stainless steel glazing channel embedded in solid surfacing counter equal to CR Laurence Company, product "CRL Wet/Dry Glaze U-Channel".

2.5 CABINET HARDWARE

- A. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on companies and products named under each particular hardware item. Manufacturers offering similar products which may be considered as equal, include the following:
 1. Catches and latches
 - a. Stanley Hardware, New Britain CT.
 - b. Häfele America Company, Archdale NC.
 - a. Timberline Supply Ltd., Lake Bluff IL.
 2. Drawer slides:
 - a. Accuride Corp., Santa Fe Springs, CA.
 - b. Grass America Inc., Kernersville NC.
 - c. Häfele America Company, Archdale NC.
 - d. Knappe & Vogt, Grand Rapids, MI.
 3. Coat hooks:
 - a. Spectrum Plastics Ltd Poulton Le Fylde Lancashire, UK.
 - b. DuraHook Limited Bolton Greater Manchester, UK.
 - c. HEWI Heinrich Wilke GmbH.
 4. Closet rods:
 - a. Knappe & Vogt, Grand Rapids, MI.
 - b. Häfele America Company, Archdale NC.

- c. Stanley Hardware, New Britain CT.
 - d. C.R. Lawrence Co., Inc., Los Angeles, CA
 5. Hinges:
 - a. Grass American Inc., Kernersville, NC
 - b. Julius Blum, Inc., Stanley NC.
 - c. (Lamp) Sugatsune America, Inc. Carson, CA.
 6. Locks
 - a. Häfele America Company, Archdale NC.
 - b. National Cabinet Lock, Mauldin SC.
 - c. Timberline Supply Ltd., Lake Bluff IL.
 7. Pulls and knobs:
 - a. (Lamp) Sugatsune America, Inc. Carson, CA.
 - b. Engineered Products Company, Flint MI.
 - c. H.B. Ives Company, Wallingford CT.
 - d. Häfele America Company, Archdale NC.
 8. Shelf supports (excluding Main Lobby display cases):
 - a. Häfele America Company, Archdale NC.
 - b. Knape & Vogt, Grand Rapids, MI.
 - c. Stanley Hardware, New Britain CT.
 9. Keyboard trays and Miscellaneous Specialties:
 - a. Waterloo Furniture Components, Ontario, Canada
 10. Wire grommets:
 - a. Dave Mockett & Company, Inc., Manhattan Beach, CA.
 - B. Door and drawer pulls:
 1. Typical: Staple-shape 45° offset wire pull, 4 inches long, solid brass with US26D, brushed chrome finish, with one-inch finger clearance.
 - C. Locks: Provide at least three keys per keyed alike group.
 1. Locks for drawers: Deadbolt type, equal to Timberline Supply, Model C281CB, lock plug finish LP-100 (nickel finish).
 2. Locks for single cabinet doors: Deadbolt type, equal to Timberline Supply, Model C291CB, lock plug finish LP-100 (nickel finish)
 3. Locks for double base cabinet doors: Deadbolt type, equal to Timberline Supply, Model C251CB, lock plug finish LP-100 (nickel finish)
 4. Locks for double upper cabinet doors: Deadbolt type, equal to Timberline Supply, Model C256CB, lock plug finish LP-100 (nickel finish)
 5. Locks for double door wardrobe: 3 point vertical lock bar type, equal to National Cabinet Lock Stock Lock disc tumbler handle lock (C8754) on right leaf with aluminum vertical rods and guides, and latch plate and tongue (C8756-2C). Provide dummy handle (C8755) on the left leaf. System shall be utilized in conjunction with automatic latching and releasing door catch to ensure the door without the vertical lock bar is automatically secured when
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both doors are closed and automatically released upon opening leaf with vertical bar lock.

6. Provide and coordinate all strike plates needed for each lock type.

D. Catches:

1. Typical: Small zinc roller catch with white roller, length, $\frac{3}{4}$ inch, width, 1-3/8 inch, projection, 3/8 inch.
2. Wardrobe catch: Automatic latching and releasing door catch to ensure door without vertical lock bar is automatically secured when both doors are closed and automatically released upon opening leaf with vertical bar lock. Equal to Timberline Supply, Model D300DL-BLK.
3. Magnetic pressure catch: Equal to Hafele Magnetic Pressure Catch, Model number 245.80.320 and Hafele Strikes, Model number 2485.63.988.

E. Typical millwork hinges:

1. Typical millwork hinges: Five knuckle institutional, offset type for all swinging doors. Hinges shall be 2-1/2 inches long. Hinges are mounted with flathead screws, so applied to cabinets to withstand a weight load of 150 pounds minimum.
 - a. Hinge finish: satin stainless steel.
 - b. Number of hinges:
 - 1) Doors 48 inches and less in height: 2 hinges.
 - 2) Doors over 48 inches in height: 3 hinges.
2. Reception and Media Center Millwork Hinges: Self closing concealed hinge having maximum 125 degree angle of opening. Hinges shall be equal to Blum "Modul 125 Series", with straight arm, Model N°. 95M5550.

- F. Pad silencers for doors: 10 mm (3/8 inch) diameter, self-adhesive resilient plastic or nylon buttons, at least 2 per door, in clear color.

G. Drawer Slides (provide one pair per drawer except as noted otherwise):

1. For file cabinets: Full extension type, 150 pounds per pair minimum rated capacity (for drawers over 30 inches, provide 175 pounds rated capacity), steel ball bearing rollers, drawer hold in feature. Finish: clear lacquered zinc. Acceptable slides are limited to:
 - a. For drawers up to 24 inches wide:
 - 1) Accuride N°. 4032.
 - 2) Knape and Vogt N°. 8500.
 - 3) Häfele N°. 4034.
 - b. For drawers over 24 inches and up to 30 inches wide:
 - 1) Accuride N°. 4032.
 - 2) Knape and Vogt N°. 8500.
 - 3) Häfele N°. No equal.
 - c. For drawers over 30 inches wide:
 - 1) Accuride N°. 4437.
 - 2) Knape and Vogt N°. 8520.
 - 3) Häfele N°. No equal.

2. For desk and millwork drawers (excluding file drawers): Full extension type, 100 pounds per pair minimum rated capacity, steel ball bearing rollers, lever disconnect, drawer hold in detent feature. Finish: clear lacquered zinc.
 - a. Accuride N°. 3832A.
 - b. Knappe and Vogt N°. 8400.
 - c. Häfele N°. 3832.
- H. Shelf pins for laminated shelving at open cabinets: High strength nylon with embedded steel pin, equal to Blum Model N°. 34.0040 in clear color, for 5 mm diameter hole.
- I. Shelf standards and supports at closed cabinets.
 1. Shelf standards with clip-type supports:
 - a. Standards 5/8 inch wide by 3/16 inch high steel standards with 1/2 inch centers for shelf supports, zinc plated finish, of lengths required for conditions applied, equal to Knappe & Vogt model N°. 255 steel standards.
- J. Shelf clips: Transparent plastic clips for wood and plastic laminate shelves, equal to Häfele model N°. 282.47.402.
- K. Coat hooks:
 1. Coat hooks: Dual plastic coat hook equal to Toughook 80mm Coat Hook. Up to five colors to be selected by Architect from manufacturer's standard colors.
- L. Wire management grommets and covers: 3 inch diameter, as manufactured by Doug Mockett & Company, Manhattan Beach CA., (800) 523-1269, model number "EDP." Provide where shown on Drawings, and if not shown, allow the following numbers of grommets; exact locations to be determined in field.
 1. For counters 6 feet or less provide 2 wire grommets and covers.
 2. For counters over 6 feet, provide 1 wire grommet and cover for every 42 inches of counter, or fraction thereof.
- M. Keyboard trays: Slide out keyboard tray, adjustable height with sliding mouse tray; Waterloo Furniture Components product 4470D, or approved equal.
- N. Label holders: Solid cast brass 3 inch by 2 inch label holder with satin nickel finish, drilled and countersunk to receive two slotted screw attachments

2.6 SHELVING AT ANDY'S ATTIC

- A. Adjustable shelving, wall mounted standards and brackets:
 1. Manufacturer: Rakks/Rangine Corporation, Needham MA or approved equal.
 2. Standards (uprights): Rakks/Rangine "C-Style" or "D -Style" recessed or surface mounted wall standards, extruded aluminum.
 3. Brackets: Rakks/Rangine "Hangbar", "J-Hangbar", "Waterfall" brackets, extruded aluminum.
 4. Finish: Clear anodized to match Architect's control sample.

2.7 ACCESSORIES

- A. Wall panel fastening system: Extruded aluminum “Z” clip panel fasteners as manufactured by one of the following:
 - 1. Scottvale Metal Products, Inc., Bohemia, NY.
 - 2. Monarch Metal Fabrication, Inc., Bohemia, NY.
 - 3. Brooklyn Hardware, Portland OR.

- B. Counter support brackets: Equal to “Flush Mount Counter Supports” by Rakks/Rangine Corp, Needham MA.
 - 1. Construction: Fabricated from horizontal aluminum T section and vertical aluminum L section. Vertical leg designed to attach to side of supporting stud and be concealed by gypsum board or other wall finish.
 - a. Model EH-1212FM for up to 18 inch deep counters.
 - b. Model EH-1818FM for up to 24 inch deep counters.
 - c. Model EH-1824FM for up to 30 inch deep counters.
 - 2. Factory applied finishes: Exposed aluminum surfaces shall be free of scratches and other serious blemishes and be factory finished with:
 - a. Electrostatically applied, powder paint coating complying with AAMA 2603 (minimum), custom color selected by Architect.

- C. Adhesive for installation of plastic laminate: Rigid bond Polyvinyl acetate (PVA) type only. Contact cements are only permitted at countertops with sinks or similar “wet condition” areas.

- D. Glue for lamination and fabrication of wood and plywood items: Exterior Grade, phenolic resin glue.

- E. Bolts, nuts, washers, lags, pins, and screws: Of size and type to suit application chrome finish in exposed-to-view locations.
 - 1. Concealed joint fasteners: Threaded steel.

- F. Sealant, for joints between countertops and dissimilar materials: One component acetoxysilicone rubber, mildew resistant, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Class 25, Grade NS, use NT, G and A with a minimum movement capability of ± 25 percent, and a Shore A hardness of 20, in manufacturer’s standard colors as selected by the Architect.
 - 1. Only use sealant and primers that comply with the following limits for VOC content:
 - a. Architectural sealants: 250 g/L.
 - b. Sealant primer: 250 g/L
 - 2. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.
 - 3. Subject to requirements specified herein, the following products are acceptable, or approved equal:
 - a. Dow Corning Corporation, Midland MI; product, “786”.

- b. General Electric Company, Waterford NY; product, "Sanitary 1700".
- c. Sonneborn Building Products Inc., Minneapolis MN; product, "Sonolastic - OmniPlus".
- d. Tremco, Beachwood OH; product: "Proglaze".

2.8 FABRICATION - GENERAL

- A. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Coordinate the fabrication of millwork with that of the various trades responsible for installing materials and items which will be inserted into, or applied to, the millwork surfaces. Obtain and verify templates, dimensions, and instructions from the respective trades before making cut-outs, holes, slots, and other cutting in the millwork.
- C. Shop assemble custom millwork for delivery to site. Deliver in assemblies as large as possible for entrance into the designated areas. Provide for concealed job connections of adjacent units.
- D. Fabricate, install and finish all work so that both sides of countertops, panels, doors, shelves and other millwork are of balanced construction, to prevent warping.
- E. Cap exposed plywood with solid hardwood, matching color of wood veneer panels. Apply veneer over hardwood edging in manner to show no visible lines between wood veneer and hardwood edging.
- F. Fit corners and joints hairline, secure with concealed fasteners.
- G. Finish all solid wood and plywood surfaces smooth, and free from all machine and tool marks that will show through the wood veneer or facing materials.
- H. Make all joints tight, and form to conceal shrinkage. Glue all miters having a dimension of 4 inches or more from heel to point.
- I. Provide shop fabricated counters, shop mitered components, closure trims with ample allowance for field cutting and fitting. Provide additional trim as required for scribing and site cutting.
- J. Finished work shall be free from visible adhesive and pencil marks.

2.9 FABRICATION - MILLWORK

- A. Fabricate millwork in accordance with requirements of specified AWI Grade and the following additional requirements:
 - 1. Cabinets shall be in flush overlay construction, with drawer fronts and hinged doors overlapping openings a minimum of 1/4 inch all four sides.
 - 2. Fabricate cabinets in integral units, each completely enclosed, without the use of common partitions.
 - 3. Fabricate plastic laminated millwork with top and bottom fillers and corner panels described as optional for Custom Grade Work in the Quality Standards.

4. Drawers:
 - a. Drawer sides and backs: Dovetail construction, 1/2 inch thick solid hardwood of specified species.
 - b. Laminated drawer fronts: High density laminate over 3/4 inch specified core material. Drawer fronts shall be applied to separate drawer body component sub-front.
 - c. Drawer bottoms (plastic laminated millwork): 1/4 inch thick plywood panel with plastic laminate, housed and glued into front, sides and back.
 - d. Underside of drawer to receive continuous hot melt glue at joint between bottom and back/sides/front for sealing and rigidity.
 - e. Reinforce drawer bottoms as required with intermediate spreaders.
5. Doors: Square edge design, 3/4 inch thick, without any profiling and shall fully overlap the cabinet frame.
 - a. Laminate doors: Fabricate doors with plywood core and front and rear faces high-pressure laminate, of selected color.
 - b. Maintain a maximum 1/8" reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
6. Base cabinets: Provide full horizontal top frame with glued and doweled joints, 3/4 inch plywood end panels and bottom. Bottom shall be glued and doweled and let into routed end panels. Provide 4 inch high toe rail, securely screwed to the end panels and to the bottom panel by concealed glue blocks.
7. Wall cabinets: Provide same finishes as base cabinets, with 3/4 inch thick top and bottom plywood panels. Top and bottom panels shall be glued and doweled and let into routed end panels. Back of case shall be recessed and let into routed end panels and further secured with glue blocks.
8. Door and drawer spreaders: Provide minimum 3/4 thick full width cabinet body spreaders immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, and close off reveal. Front edge to be match face of adjacent cabinet doors/drawers.

2.10 FABRICATION OF PLASTIC LAMINATE CLAD ITEMS

- A. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Except as otherwise specified hereunder, fabricate plastic laminate clad items in strict accordance with the details on the Drawings, the approved shop drawings, and workmanship standards set forth in the AWI Quality Standards Section 400, for specified Quality Grade.
- C. Shop fabricate all plastic laminate clad items. Adhere plastic laminate to plywood backing sheets by cold-press-method. Use of contact cements are not permitted. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Apply laminate backing sheet to reverse side of all laminated, panels, shelving and tops.
- D. Fit corners and joints hairline. Make all joints and miters tight, secure with concealed fasteners.

2.11 SHOP APPLIED FINISHING

- A. Transparent exposed-to-view finish for millwork: AWI Premium Grade Factory Finish System N° TR-4 "Conversion Varnish" system having a Medium rubbed effect with a sheen of 24° to 28° gloss units per ASTM D523. Finish system shall not substantially increase flame spread.
 - 1. One washcoat, reduced conversion varnish.
 - 2. Colorant: None - natural finish.
 - 3. One coat sealer, conversion varnish.
 - 4. Two coats topcoat: Conversion varnish equal to Sherwin Williams product "V84 series Kem Var".
- B. Concealed surfaces: Thoroughly coat all concealed surfaces of finish woodwork before assembling with two coats of clear wood preservative.
- C. Field Touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify adequacy of blocking, backing and support framing for all finish carpentry work.
 - 2. Examine pre-fabricated woodwork before installation and verify all packing has been removed.
 - 3. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Before installing work under this section, woodwork shall be conditioned to average prevailing humidity conditions in areas of installation.
- B. Protect other Work against undue soilage and damage by the exercise of reasonable care and precautions. Clean, repair, or replace any work so damaged and soiled to the acceptance of the Architect.

3.3 INSTALLATION - GENERAL

- A. Install work in accordance with the latest AWI *Architectural Woodwork Standards* in grade specified herein, under the Article entitled "QUALITY ASSURANCE".
- B. Woodwork shall be installed plumb, level, true and straight without distortions.
 - 1. Use concealed shims as required
 - 2. Work shall be installed to a tolerance of 1/8 inch in 8 feet for plumb and levelness, including tops.

- 3. There shall be no variations in flushness of adjoining surfaces.
 - C. Tops and woodwork shall be scribed and trimmed to fit adjoining work.
 - 1. Where cuts occur, refinish surfaces and repair damaged finishes
 - D. Secure woodwork to anchors or built-in blocking or blocking directly attached to substrates.
 - 1. Secure woodwork to grounds, furring, stripping and blocking as required with countersunk, concealed fasteners and blind nailing performing a complete installation.
- 3.4 INSTALLATION - MILLWORK AND COUNTERTOPS
- A. Install millwork without distortion so that doors and drawers fit openings properly and are accurately and evenly aligned.
 - B. Adjust millwork hardware centering the doors and drawers in the openings, and provide unencumbered operation.
 - C. Complete the installation of hardware and accessory items as indicated.
 - D. Tops: Anchor tops securely to base units and to other support systems as required.
- 3.5 TOLERANCES
- A. Maximum variation from true position 1/16 inch with a maximum of 1/32 inch offset from true alignment with adjoining surfaces intended to be flush.
- 3.6 ADJUSTING
- A. To whatever extent work was not completed at shop or prior to installation of woodwork, perform and complete the specified finishing of woodwork.
 - B. Repair damaged and defective woodwork where possible eliminating defects functionally and visually.
 - 1. Where not possible to repair damaged or defective work, replace with matching new work.
 - 2. Adjust joinery for uniform appearance.
 - C. Adjust doors and drawers for smooth and balanced movement, lubricate hardware for use.
- 3.7 CLEANING
- A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
 - B. Daily clean work areas by sweeping and disposing of scraps and sawdust.
 - C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area leave area in broom-clean condition.
-

- D. Clean excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.
- E. Remove protective material from pre-finished surfaces, immediately prior to Final Acceptance.
- F. Carefully clean exposed and semi-exposed wood surfaces, in strict accordance with fabricator's instructions. Touch-up shop-applied finishes to restore damaged or soiled areas, matching adjoining finish.
- G. Wash down plastic laminate with a solution of mild detergent in warm water, applied with soft clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- H. Clean and polish hardware, and bright metal trim components.
- I. Vacuum clean all cabinets and drawers.

3.8 PROTECTION

- A. Protect installed woodwork and maintain specified conditions, in a manner acceptable to both fabricator and installer. Ensure that work of this Section will not be damaged or soiled, and is completely free of defects at the time of final acceptance of Project by the Architect.
- B. Protect stored material from damage by other trades, including vacuuming and cleanup of sawdust in cabinets and drawers.

End of Section

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Section 06 61 16
SOLID SURFACING FABRICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install solid surfacing (solid polymer) fabrications, including but not limited to the following:
 - 1. Solid surfacing countertops and backsplashes.
 - 2. Solid surfacing window stools and aprons (interior sills).
 - 3. Sealant for joints between countertops, backsplashes and abutting surfaces.
 - 4. Solid surfacing cap and trim at low walls and ramp curbs.
 - 5. Solid surfacing at cubbies.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and nailers.
- F. Section 06 40 00 - ARCHITECTURAL WOODWORK: Cabinetry, shelving and other shop fabricated casework.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data. Identify available colors, shades, and gloss
2. Shop drawings: Large scale design details of minimum 1-1/2 inch-to-1 foot scale, showing abutting materials, installation conditions, clearances. Show profiles, jointing and fastening methods.
3. Selection samples:
 - a. Solid surfacing samples for initial color selection by Architect.
 - b. Sealant material: Manufacturer's standard strips of sealant, in all available colors, for selections by the Architect.
 - c. Provide additional samples as requested by Architect for initial selection of material colors and finishes.
4. Verification samples:
 - a. 12 by 12 inch samples of solid surfacing materials.
5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.4 QUALITY ASSURANCE

- A. Fabricator and Installer; with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
 1. Fabricator and Installer for solid surfacing products shall be trained and certified by solid surfacing manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Concrete, masonry, plaster, tile setting, and other wet work shall be completed and dry before delivery, storage and installation of fabricated solid surface items.
- B. Ship and handle all materials and fabricated items in a manner which will prevent damage thereto, and store all materials and fabricated items at a dry, elevated, ventilated, and protected interior location.
- C. Sequence deliveries to avoid delays and to minimize on-site storage.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature above 55 degrees Fahrenheit for 5 calendar days before, during, and after installation of solid surfacing fabrications; maintain temperature until Owner's Final Acceptance.

1.7 FIELD MEASUREMENTS

- A. Field dimensions: The fabricator is responsible for details and dimensions not controlled by Project conditions and shall show on his shop drawings all required field measurements beyond his control.
 - 1. The Contractor shall acknowledge the fabricator's need for accurate field dimensions prior to custom fabrication.
 - 2. The Contractor and the fabricator shall cooperate to establish and maintain these field dimensions.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on E.I. du Point Nemours & Co., Inc., Wilmington DE product "Corian".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. E. I. du Pont de Nemours and Company, Inc., Wilmington DE, product: "Corian".
 - 2. Aristec Acrylics LLC (Avonite Surfaces), Florence, KY, product: "Avonite".
 - 3. Formica Corporation, Cincinnati, OH, product: "Solid Surfacing".
 - 4. Wilsonart International, Inc. Temple TX, product: "Gibraltar".

2.2 SOLID SURFACING MATERIALS

- A. Polymer solid surfacing material: Non-porous surfacing material homogeneously composed of natural minerals and high-performance polymer, fabricated sizes and profiles as shown on the Drawings, in colors and finishes as selected by Architect.
 - 1. Solid surfacing material shall be NSF (National Sanitation Foundation) listed under publication 51 - Plastic Materials and Components used in Food Equipment and bear the "component" mark.
 - 2. Colors and patterns shall be as selected by the Architect.
 - a. Basis of design colors shall be as selected from Corian "Price Code D (2013)" or approved equal.
 - 3. Complies with requirements of ANSI Z124.3, Type 6 and WW-P-541E/GEN.
 - 4. Seaming/Jointing: Structural two-part joint adhesive to form smooth and inconspicuous seam, without voids.
- B. Sheet thicknesses shall be as specified below or as otherwise indicated on Drawings.
 - 1. Countertops: One piece monolithic design 1/2 inch thick, with integral cast-in sinks.
 - 2. Countertop edges: Double-rounded edges, using 1/2 inch build-up strip adhered to countertop with joint adhesive. Top and bottom edges shall be routed using 1/2 inch round-over bit.
 - 3. Backsplashes: 1/2 inch thick in locations and heights as shown on the Drawings.
 - 4. Plywood backing: 1/2 inch thick APA C-C PLUGGED EXT, fir plywood, sanded
- C. Undermount sinks (where indicated): Undermount-design bowls having square edge top. Corian model 815 having a bowl size of 16-7/16 inch length by 22-7/16 inch width by 8-3/16 inches deep. Color shall match counter.
- D. Adhesive for build-up of solid surfacing sheets: color matched two-component seam adhesive as provided by solid surfacing manufacturer.
- E. Adhesive for installation of trim components, neoprene panel adhesive or structural silicone glazing sealant, as recommended by solid surfacing manufacturer.

2.3 ACCESSORIES

- A. Sealant, for joints between countertops and dissimilar materials: One component acetoxysilicone rubber, mildew resistant, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Class 25, Grade NS, use NT,G and A with a minimum movement capability of ± 25 percent, and a Shore A hardness of 20, in manufacturer's standard colors as selected by the Architect, equal to one of the following:
 - 1. Dow Corning Corporation, Midland MI; product, "786".
 - 2. General Electric Company, Waterford NY; product, "Sanitary 1700".
 - 3. Sonneborn Building Products Inc., Minneapolis MN; product, "Sonolastic - OmniPlus".

- 4. Tremco, Beachwood OH; product, "Proglaze".
- B. Bolts, nuts, washers, lags, pins, and screws: Of size and type to suit application chrome finish in exposed-to-view locations.
- C. Fir plywood for backing: EWA C-C PLUGGED EXT.
- D. Concealed supports for edge and corner backing shall be kiln dried birch or poplar.

2.4 FABRICATION

- A. Coordinate the fabrication of solid surfacing products with that of the various trades responsible for installing materials and items which will be inserted into, or applied to, the countertop surfaces. Obtain and verify templates, dimensions, and instructions from the respective trades before making cut-outs, holes, slots, and other cutting in the countertops.
- B. Shop fabricate all solid surfacing items in strict accordance with the details on the Drawings, the approved shop drawings, and recommendations of the solid surfacing manufacturer
 - 1. Prepare countertops for undermount design sinks furnished and installed under Division 22 - PLUMBING.
 - 2. Prepare solid surfacing fabrications for installation of plumbing fixtures.
- C. Fit corners and joints hairline. Make all field joints and miters tight, secure with concealed fasteners.
- D. Provide shop fabricated counters, shop mitered components, closure trims with ample allowance for field cutting and fitting. Provide additional trim as required for scribing and site cutting.
- E. Route all edges to be butted for a smooth, clean fit. Sand edges with 120 grit sandpaper to rough up surfaces for adhesive bonding. Clean with denatured alcohol.
- F. Prepare and apply adhesive in compliance with manufacturer's written instructions. Clamp all components using manufacturer's approved clamping methods at all joints and build-up laminations, maintain clamping until adhesive is set. Avoid over-tightening clamps and squeezing out adhesive.
- G. Remove excess adhesive when dry with router. Follow with belt sander using 120 grit, diagonal to joint. After adhesive is leveled and smooth with surface, proceed with final shaping and finishing.
- H. After shaping, smooth finish of cut surfaces equal to manufacturer's original finish. Sand surfaces smooth with wet 400 grit sandpaper. Remove superficial scratches and sander markings, buff with nylon buffing pads as recommended by solid surfacing manufacturer. Wipe surfaces clean and dry with cloths.
- I. Finished work shall be free from visible adhesive and pencil marks.
- J. Field touch-up: Shall be the responsibility of the installer and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of

surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. General: Install work in accordance with manufacturer's instructions.
- B. Solid surfacing shall be installed plumb, level, true and straight without distortions:
 - 1. Use concealed shims as required
 - 2. Work shall be installed to a tolerance of 1/8 inch in 8 feet for plumb and levelness, including tops.
 - 3. There shall be no variations in flushness of adjoining surfaces.
- C. Tops and trim shall be scribed and trimmed to fit adjoining work.
 - 1. Where cuts occur, refinish surfaces and repair damaged finishes
- D. Secure solid surfacing fabrications to blocking directly attached to substrates.
 - 1. Secure fabrications using concealed fasteners.
 - 2. Anchor tops securely to base units and to other support systems as required.
- E. After installation and leveling of solid surfacing fabrications has been completed; apply a continuous bead of specified sealant to all joints which abut walls or partitions. Tool the sealant to a uniformly dense surface, level with the edges of the casework. Immediately remove all excess sealant from solid surfacing surfaces.

3.2 TOLERANCES

- A. Maximum variation from true position 1/16 inch with a maximum of 1/32 inch offset from true alignment with adjoining surfaces intended to be flush.

3.3 CLEANING

- A. Daily clean work areas by sweeping and disposing of scraps.
- B. Clean excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and solid surfacing manufacturers.
- C. Wash down exposed surfaces with a solution of mild detergent in warm water, applied with soft clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.4 PROTECTION

- A. Protect installed fabrications in a manner acceptable to fabricator and installer, which shall ensure no damage or deterioration at the time of Final acceptance of Project by the Architect.

End of Section

Section 07 00 01
WATERPROOFING, DAMPPROOFING AND CAULKING TRADE CONTRACT
REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

1. Specification requirements for the Trade Contract "Waterproofing, Dampproofing and Caulking" include all the following listed Specification Sections, in their entirety:
- a. Section 07 11 13 – BITUMINOUS DAMPPROOFING
 - b. Section 07 13 53 – ELASTOMERIC SHEET WATERPROOFING
 - c. Section 07 16 13 – POLYMER MODIFIED CEMENT WATERPROOFING
 - d. Section 07 27 13 – MEMBRANE AIR BARRIERS
 - e. Section 07 92 00 – JOINT SEALANTS
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 07 00 01 – WATERPROOFING, DAMPPROOFING
AND CAULKING TRADE CONTRACT
REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:

1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17,

S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.

2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.
3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 QUALITY ASSURANCE

- A. Company specializing in work described in the above listed individual specification Sections with minimum 5 years documented experience.

1.5 SEQUENCING

- A. Phasing: Refer to Section 01 10 00 - SUMMARY, and Drawings for phasing and milestone completion requirements which affect the Construction Manager's Work and the Work of this Trade Contract. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

- A. General: Waterproofing, Dampproofing and Caulking Trade Contractor shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work and all other Work requiring such equipment as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
1. Scaffolding and staging required pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor.
 2. Waterproofing, Dampproofing and Caulking Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
 4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.2 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 – EXECUTION (NOT USED)

End of Section

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Section 07 00 02

ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements:
1. Specification requirements for the Trade Contract "ROOFING AND FLASHING" include all of the following listed Specification Sections: in their entirety:
 - a. Section 07 00 02 – ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS
 - b. Section 07 54 19 – POLYVINYL-CHLORIDE (PVC) ROOFING
 - c. Section 07 61 20 – FIELD-FORMED METAL ROOFING AND CLADDING
 - d. Section 07 62 00 – SHEET METAL FLASHING AND TRIM
 - e. Section 07 71 00 – ROOF SPECIALTIES
 - f. Section 07 72 00 – ROOF ACCESSORIES
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 07 00 02 – ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:

ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS

1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17,

S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.

2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.
3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 QUALITY ASSURANCE

- A. Company specializing in work described in the above listed individual specification Sections with minimum 5 years documented experience.

1.5 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

- A. General: Roofing and Flashing Trade Contractor shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work and all other Work requiring such equipment as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor.
 - 2. Roofing and Flashing Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
 - 4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.2 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION

3.1

SITE MAINTENANCE

- A. The Roofing and Flashing Trade Contractor shall furnish and maintain dumpsters as required to adequately control the disposal of all trash, construction debris, and waste materials resulting from the work of this Trade Contract.
 - 1. The Roofing and Flashing Trade Contractor is responsible for all costs to obtain, maintain and disposal of dumpsters.
 - 2. Disposal: Empty dumpsters on frequent regular basis as necessary to prevent overflow spillage. Legally dispose of waste off-site.
- B. Daily clean work areas. Sweep and place into the dumpster(s) furnished by this trade, all pallets, construction debris, unused materials, and other waste materials resulting from the Work of this Trade Contract.
- C. After completion of the work of this Section, remove equipment, tools, and unused materials, remove all remaining waste materials and construction debris related to the work of this Trade Contract. Clean all areas completely free from residue and materials installed under this Section.

End of Section

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Section 07 11 13
BITUMINOUS DAMPPROOFING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract: As provided under Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING Trade Contract REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 01.

1.2 SUMMARY

- A. Furnish and install fluid applied bituminous dampproofing:
 - 1. Apply over exterior of building foundation walls, below grade.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.

- G. Section 03 30 00 - CAST-IN-PLACE CONCRETE.
- H. Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING TRADE
CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- I. Section 07 92 00 - JOINT SEALANTS: Requirements for joint sealant and backing materials.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D1227 - Emulsified Asphalt Used as a Protective Coating for Roofing.
 - 2. ASTM D2823 - Asphalt Roof Coatings.
 - 3. ASTM D449 - Asphalt Used in Dampproofing and Waterproofing.
 - 4. ASTM D4586 - Asphalt Roof Cement, Asbestos-Free.
 - 5. NRCA Roofing and Waterproofing Manual.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for dampproofing.
 - 2. Manufacturer's application instructions including, joint and crack treatment, application temperature range, and any special procedures.
 - 3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Exterior-Applied Products (adhesives, sealants, coatings, roofing and waterproofing materials) to demonstrate VOC compliance in accordance with CARB 2007 SCM for Architectural Coatings and SCAQMD Rule 1168 – July 1, 2005.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store dampproofing materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.
- B. Store all materials following manufacturer's recommended storage procedures for humidity and temperature conditions, protect materials from freezing and from high heat, flames or sparks.

1.7 ENVIRONMENTAL CONDITIONS

- A. Do not apply when ambient temperatures may fall below 35 degrees Fahrenheit or as required by manufacturer for 24 hours before and during application and until membrane has cured.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate and schedule the work of this Section with the related work of Section 04 20 00 - UNIT MASONRY, in a manner so as not to delay the smooth progress of the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or equal:
 - 1. Karnak Corporation, Clark NJ.
 - 2. Tremco Barrier Solutions, Inc., Reynoldsburg OH
 - 3. W.R. Meadows, Inc., Hampshire IL.

2.2 MATERIALS

- A. Dampproofing at below grade foundation walls: Solvent based, non-asbestos, bituminous compound equal to Karnak Product: "Number 229AR Elastomeric" complying with ASTM C836.
 - 1. Protection board: 1.0 pound per cubic foot density, 1 inch thick expanded polystyrene protection board.
- B. Crack filler: As recommended by the dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify items which penetrate surfaces to receive dampproofing are rigidly installed.

2. Verify surfaces are free of cracks, depressions, waves, or projections which may be detrimental to successful installation.
 - B. Notify the Contractor if substrate requires patching of holes over 1/2 inch in diameter or length and over 1/4 inch deep, by Section 04 20 00 - UNIT MASONRY. Do not proceed until patching is completed.
 - C. Do not apply dampproofing to damp, frozen, dirty, dusty or surfaces unacceptable to dampproofing manufacturer.
 - D. Beginning of installation means acceptance of existing substrate and site conditions.
- 3.2 PREPARATION
- A. Perform all preparation work on receiving surfaces as required, including removal of fins, scaling, and projecting rough spots, and removal of all loose mortar, dirt, oil, and other foreign matter from the substrate.
 - B. Protect adjacent surfaces not designated to receive dampproofing.
 - C. Cracks and joints in substrate surface must be properly sealed as recommended by the dampproofing manufacturer.
- 3.3 APPLICATION
- A. Perform the application of the dampproofing in strict accordance with the manufacturer's installation instructions, and as specified herein.
 1. Apply joint tape at all sheathing joints . Apply thin coating of dampproofing material over joints and embed joint tape.
 - B. Apply primer when so required by manufacturer's instructions.
 - C. Trowel, spray or brush apply as applicable to specified product, in one coat leaving no pinholes, defects or undercoated areas. Apply at coverage rate recommended by the manufacturer but not less than 4 to 6 gallons per 100 square feet.
 - D. After application of dampproofing is completed, carefully inspect the entire dampproofed surface for defects therein and patch all defects discovered.
- 3.4 PROTECTION
- A. Protect dampproofing film and allow to cure for at least 48 hours before installation of rigid insulation.

End of Section

Section 07 13 53
ELASTOMERIC SHEET WATERPROOFING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 01)

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract: As provided under Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING Trade Contract REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 01.

1.2 SUMMARY

- A. Furnish and install the following:
 - 1. Adhered vertical waterproofing: Self-adhesive sheet membrane vertical waterproofing applied to exterior surfaces of new below-grade concrete walls at location noted on the drawings.
 - a. Prefabricated composite drainage board over membrane waterproofing system.
- B. Factory representative field inspections of installed waterproofing.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 03 30 00 - CAST-IN-PLACE CONCRETE: for requirements on finish.
- H. Section 07 92 00 - JOINT SEALANTS: Requirements for joint sealant and backing materials.

1.4 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. ACI 515 - Guide to the Use of Waterproofing, Dampproofing, and Protective and Decorative Barrier Systems for Concrete.
 2. ASTM C 578 - Preformed Cellular Polystyrene Thermal Insulation.
 3. ASTM C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
 4. ASTM C 898 Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane With Separate Wearing Course.
 5. ASTM D 146 - Sampling and Testing Felted and Woven Fabrics Saturated with Bituminous Substances for Use in Waterproofing and Roofing.
 6. ASTM D 412 - Standard Test Methods for Rubber Properties in Tension.
 7. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
 8. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 9. ASTM D 1079 - Standard Terminology Relating to Roofing and Waterproofing.
 10. ASTM D 1434 - Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting.
 11. ASTM D 1682 - Test Methods for Breaking Load and Elongation of Textile Fabrics.
 12. ASTM D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel).
 13. ASTM D-1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 14. ASTM D-3767 - Standard Practice for Rubber - Measurements of Dimensions.
 15. ASTM D 3787 - Test Method for Bursting Strength of Knitted Goods: Constant Rate of Traverse (CRT), Ball Burst Test.
 16. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 17. ASTM D 5385 - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
 18. ASTM E 96 - Tests for Water Vapor Transmission of Materials in Sheet Form.
 19. ASTM E 154 - Testing Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces.
- B. General References The following reference materials are hereby made a part of this Section by reference thereto:
1. International Concrete Repair Institute (ICRI) Technical Guideline No. 03730 - Surface Preparation Guidelines for the Repair of Deteriorated Concrete Resulting From Reinforcing Steel Corrosion.

2. International Concrete Repair Institute (ICRI) Technical Guideline No. 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

C. Definitions:

1. “Low Temperature”: The term “Low Temperature” is used herein for purposes of defining selection of appropriate waterproofing products which are manufactured for use in a specific temperate range. “Low Temperature” products are appropriate in ambient and substrate conditions which are below 40° F. (5° C.) and above 25° F. (-4° C.).

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
 1. Required attendees: Owner, Architect, Contractor, Waterproofing Applicator’s Project Superintendent, waterproofing manufacturer’s technical representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - a. Section 03 30 00 – CAST-IN-PLACE CONCRETE.
 2. Agenda:
 - a. Scheduling of demolition and waterproofing operations.
 - b. Review of staging and material storage locations.
 - c. Coordination of work by other trades.
 - d. Protection of completed waterproofing.
 - e. Establish weather and working temperature conditions to which Architect and Contractor must agree.
 - f. Emergency rain protection procedure.
 - g. Establish conditions for which a temporary waterproofing will be provided by the Contractor.
 - h. Mock-up requirements.
 - i. Manufacturer’s pre-installation deck inspection to be performed.
 - j. Flood testing procedures.
 - k. Substrate conditions, and procedures for substrate preparation and waterproofing installation.
 - l. Discuss process for manufacturer’s inspection and acceptance of completed Work of this Section.
- C. Sequencing: Coordinate the work of this Section with the respective trades responsible for installing work concealed by waterproofing.

1. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after concrete substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

1.6 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties.
 2. Shop Drawings:
 - a. Provide large scale details of all termination and transition details, penetrations, and drainage composite.
 - b. Provide large scale details of crack treatment in concrete substrate.
 3. Verification Samples:
 - a. 24 by 24 inch samples of membrane applied to cement board substrate.
 - b. 24 by 24 inch samples prefabricated drainage composite.
 - c. 24 by 24 inch samples of each type of sheet membrane waterproofing.
 4. Test and Evaluation Reports: Submit manufacturer's test reports of in-place testing performed by an independent testing agency.
 5. Manufacturer's Instructions: Manufacturer's application instructions including data for surface conditioners, joint and crack treatment and application temperature range.
 6. Applicator Reports:
 - a. Review statement: Written statement, signed by the waterproofing applicator, stating that the Contract Drawings have been completely reviewed with an agent of the waterproofing system manufacturer; accompanied by a written statement from the manufacturer that the selected sheet membrane waterproofing system is proper, compatible, and adequate for the application shown.
 - 1) The waterproofing applicator will notify the Architect and Owner in writing that the as-built field conditions when exposed are in conflict with the Contract Documents for the proper application of the selected waterproofing system or the warranty requirements.
 - b. Provide compatibility documentation for where systems are in contact with roof or foundation.
 7. Manufacturer Reports: Submit manufacturer's representative's field inspections reports.
 8. Qualification Submittals:
 - a. Workmen Qualifications: Statement of qualifications for on-site supervisor, as required under the Article entitled "Quality Assurance" specified herein below, include certifications of workers who have completed a installation training program.
 - b. Provide certification for all site personnel who will be applying product.
 9. LEED Submittal Requirements:

- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Bonds and Warranty Documentation: Manufacturer's and Applicator's warranties, include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.7 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
1. Field Supervised Work: Contractor shall notify Architect before beginning work of this Section. Obtain Architect's approval of Contractor's procedures before proceeding with the work.
- B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of waterproofing system.
- C. Qualifications:
1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, trained and authorized by product manufacturer.
 - a. Qualifications of on-site supervisor (foreman): Minimum 5 years experience in successful application of specified waterproofing system, fully trained, and authorized by the waterproofing manufacturer.
 - b. Qualifications of on-site workman: The Applicator shall maintain a steady work crew consisting of qualified craftsmen and a full time foreman (supervisor), on site daily. The Contractor shall confirm that all workmen under his direction fully understand the requirements of the job.
- D. Manufacturer's On-site Inspections: Make arrangements to have Manufacturer's representative (employed by manufacturer) be present on-site during the Work of this Section at key points, which include, but are not limited to:
1. Pre-installation conference.
 2. Review of installation procedures (a minimum of 3 site visits are required; including one for foundation and one for exterior walls).
 3. Inspection of installation prior to flood testing.

- E. Preconstruction Testing: Applicator's review statement that in-situ conditions are acceptable for application of waterproofing system.

1.8 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
 - 1. General horizontal waterproofing mockup at deck, minimum 160 square feet of horizontal waterproofing with a not less than a 6 foot length vertical transition. Mockup to represent finished work including internal and external corners, seam jointing, attachment method, and counter-flashing.
- B. Workmen preparing mock-ups shall be same as those performing the work.
- C. Accepted mock-up may remain as part of the work; the number of mock-ups shall not be restricted.
 - 1. Mock-ups not approved shall be removed in their entirety down to substrate.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver and store waterproofing materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. General: Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - a. Store all materials in an elevated, dry location, protected by waterproof coverings.
 - b. Protect materials from freezing.
 - c. Store liquid products in a well ventilated area having a minimum ambient temperature of 40 degrees Fahrenheit and a maximum of 80 degrees Fahrenheit. Protect primers, mastic and adhesives from high heat, flames or sparks.
 - 3. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle.
- C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.10 SITE CONDITIONS

- A. Maintain ambient temperatures above 40 degrees Fahrenheit or as required by manufacturer for 24 hours before and during application and until liquid or mastic accessories have cured.

1.11 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manufacturer's Warranty: Provide 5 year Manufacturer's warranty which shall include replacement of defective materials.
- C. Special Warranty: Provide 3 year Applicator's warranty or performance bond which shall include removal and replacement of defective materials, and repairs or replacement of Owner's materials and products damaged due to failure of waterproofing installation to resist water or moisture penetration
- D. Extended Correction Period: Membrane waterproofing shall be guaranteed for 3 years with the Contractor or water-proofing Subcontractor agreeing to repair or replace work which leaks or otherwise fails to perform as required due to failures of materials or workmanship. This shall include the removal and replacement of any work which conceals the membrane work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
 - 1. Carlisle Coatings and Waterproofing, Inc., Wylie, TX., ("Carlisle").
 - 2. W.R. Grace & Co., Cambridge MA., ("Grace").
 - 3. Henry Company, El Segundo CA., ("Henry").
 - 4. Polyguard Products Inc. Ennis, TX., ("Polyguard").
 - 5. W.R. Meadows, Hampshire, IL., ("Meadows").

2.2 ADHERED VERTICAL WATERPROOFING

- A. Basis of Design (Specified Product): Carlisle Coatings and Waterproofing, Inc., Wylie, TX, product "MiraDri 860/861".
 - 1. Acceptable Manufacturers/Products: Subject to compliance with the requirements specified herein, similar sheet waterproofing products include the following:
 - a. Carlisle, product "MiraDri 860/861".
 - b. Grace, product: "Bituthene 3000".
 - c. Henry, product "Blueskin WP 200".
 - d. Polyguard, product "Polyguard Underseal PRM".
 - e. Meadows, product "Mel-Rol".

- B. Sheet membrane: Prefabricated composite sheet, minimum of 60 mils thick, consisting of 56 mils thickness of rubberized asphalt and 4 mils thick cross-laminated polyethylene film, self-adhering after removal of release paper, and furnished in 36 or 48 inch wide rolls, formulated for anticipated ambient temperature, and meeting or exceeding the specified physical properties.
- C. Waterproofing Membrane Physical Properties:
1. Flexibility: Unaffected when tested by ASTM D 1970 at -25 degrees F.
 2. Tensile strength for membrane, as per ASTM D 412, modified: 300 pounds per square inch, minimum.
 3. Tensile strength for film, as per ASTM D 412, modified: 5,000 pounds per square inch, minimum.
 4. Elongation, as per ASTM D 412, modified: 300 percent, minimum.
 5. Cycling over crack at minus 25 degrees Fahrenheit: No effect at 100 cycles.
 6. Peel adhesion, when tested per ASTM D 903 (modified) for 7 days dry at 70 degrees Fahrenheit and 120 degrees Fahrenheit and for 7 days wet at 70 degrees Fahrenheit: 7.5 pounds per inch width, minimum.
 7. Puncture resistance for membrane, (ASTM E 154): 40 pounds, minimum.
 8. Resistance to hydrostatic head of water when tested per ASTM D 5385: 200 feet of water, minimum.
 9. Exposure to fungi in soil for 16 weeks, as per GSA-PBS 07111: Unaffected.
 10. Permeance as per ASTM E 96, Method B: 0.05 perms (grains/sq. ft./hr./in. Hg), maximum.
 11. Water absorption, as per ASTM D 570: 0.2 percent by weight, maximum.
- D. Primer: Rubber based low VOC content primer formulated with high solids content which shall comply with regulatory VOC requirements.
1. Carlisle:
 - a. Conventional use: CCW-702.
 - b. Low temperature: CCW-702LT.
 - c. Green or damp concrete: CCW-715.
 2. Grace:
 - a. Conventional use: WP-3000.
 - b. Low temperature: B2.
 - c. Green or damp concrete: B2.
 3. Henry:
 - a. Conventional use: Aquatac.
 - b. Low temperature: Blue Skin Adhesive.
 - c. Green or damp concrete: No available product.
 4. Polyguard:
 - a. Conventional use: "Polyguard 650 LT Liquid Adhesive" or "Polyguard California Sealant".
 - b. Low temperature: "Polyguard 650 LT Liquid Adhesive".
 - c. Green or damp concrete: No available product.

5. Meadows:
 - a. Conventional use: Mel-Prime.
 - b. Low temperature: Mel-Prime VOC.
 - c. Green or damp concrete: No available product.

2.3 ACCESSORIES

- A. Drainage Composite Board: Prefabricated geocomposite drainage mat consisting of a formed polystyrene or PVC hollow-studded core with one side bonded with a woven or non-woven polypropylene filter fabric, which is compatible to waterproofing manufacturer. Drainage composite shall be designed to promote positive drainage while serving as a protection course.
 1. Carlisle, product series "CCW MiraDRAIN" drainage composites.
 - a. Vertical applications: Carlisle "CCW MiraDRAIN 6200", with polymeric backing.
 - 1) Thickness: nominal 0.40 inch thick [10.16 mm].
 - 2) Compressive Strength: 15,000 psi (tested per ASTM D1621).
 - 3) Maximum flow rate: 16 gallons per minute per square foot flow (tested per ASTM D 4716).
 2. Grace, product series "Hydroduct" drainage composites:
 - a. Vertical applications, Grace product: 220. (3/8 inch thick, 15 gallon per minute flow).
 - b. Horizontal applications, Grace product: 660.
 - 1) Thickness: nominal 7/16 inch thick [11 mm].
 - 2) Compressive Strength: 21,000 psf (tested per ASTM D1621).
 - 3) Maximum flow rate: 16 gallons per minute per square foot flow (tested per ASTM D 4716).
 3. Henry, product series "DB" drainage composites.
 - a. Vertical applications, Henry product: "DB 520", with polymeric backing.
 - 1) Thickness: nominal 7/16 inch thick [11 mm].
 - 2) Compressive Strength: 15,000 psi (tested per ASTM D1621).
 - 3) Maximum flow rate: 16 gallons per minute per square foot flow (tested per ASTM D 4716).
 4. Polyguard, product series "Polyflow" drainage composites:
 - a. Vertical applications, Polyguard product: Polyflow 15P Drainage Mat". (1/2 inch thick, 16 gallon per minute flow).
 - b. Horizontal applications, Polyguard product: 18 Drainage Mat.
 - 1) Thickness: nominal 1/2 inch thick [13 mm].
 - 2) Compressive Strength: 18,000 psf (tested per ASTM D1621).
 - 3) Maximum flow rate: 21 gallons per minute per foot flow (tested per ASTM D 4716).
 5. Meadows, product series "Mel-Drain" drainage composites.
 - a. Vertical applications, Meadows product: "5035-B", with polymeric backing.
 - 1) Thickness: nominal 7/16 inch thick [11 mm].

- 2) Compressive Strength: 15,000 psi (tested per ASTM D1621).
 - 3) Maximum flow rate: 16 gallons per minute per square foot flow (tested per ASTM D 4716).
- B. Primers, Sealants, crack filler, mastics, liquid detailing compound, tape, and adhesives: As recommended by the sheet membrane manufacturer.
1. Primer, as recommended for substrate conditions by waterproofing manufacturer: Rubber based low VOC content primer formulated with high solids content which shall comply with regulatory VOC requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Verify items which penetrate surfaces to receive waterproofing are rigidly installed.
 2. Verify surfaces are free of cracks, depressions, waves, or projections which may be detrimental to successful installation.
 3. Beginning of installation means acceptance of existing substrate and project conditions.
- B. Preinstallation Testing: Verify concrete substrate has been cured and is sufficiently dry in accordance with the waterproofing manufacturer's recommended application requirements.
- C. Evaluation and Assessment:
1. Notify the Contractor in writing if concrete substrate requires patching of holes over 1/2 inch in diameter or length and over 1/4 inch deep, by Section 03 30 00 - CAST-IN-PLACE CONCRETE. Do not proceed until patching is completed.
 2. Do not apply waterproofing to damp, frozen, dirty, dusty or surfaces unacceptable to membrane manufacturer.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect inished materials and products against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all materials which are soiled or otherwise damaged by Work of this Section. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work to match .
- B. Substrate Preparation – new concrete:
1. Cast-in-place concrete must be smooth, and free of unapproved curing compounds, form release agents and other surface contaminants.
 2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
 3. Remove scaling to sound, unaffected concrete and repair exposed area.
 4. Grind irregular construction joints to suitable flush surface.

- C. Cracks and joints in substrate surface must be properly sealed with joint filler and sealant as recommended by the sheet membrane waterproofing manufacturer.
- D. Clean all substrate surfaces prior to installation of waterproofing in accordance with manufacturer's instructions.

3.3 INSTALLATION – GENERAL

- A. Apply waterproofing system in strict accordance the manufacturer's installation specifications, Contract Document details, approved shop drawings and the recommendations of Manufacturer's on-site technical representative, and as additionally specified herein.

3.4 INSTALLATION - ADHERED VERTICAL WATERPROOFING

- A. Primer: Where sheet membrane is to be applied, apply primer as recommended by manufacturer at a rate of 250 to 350 square feet per gallon; areas not covered with membrane in 24 hours must be reconditioned.
- B. General: Perform the application of the sheet membrane waterproofing system in strict accordance with the manufacturer's installation specifications, details, and recommendations, and as specified herein.
 - 1. At all external and internal corners, apply a continuous strip of sheet membrane, at least 12 inches wide, centered on the axis of the corner, before the general application of the membrane.
 - 2. Apply 8 inch wide strips of the sheet membrane over all cracks greater than 1/16 inch in width.
 - 3. Apply a double layer of the sheet membrane around all penetrations in the surface. Apply a bead of compatible sealant between the top layer of membrane and the clamping rings of penetrating items and at all terminations.
 - 4. Apply the sheet membrane in strips of 8 feet in length or less, overlapping edge seams at least 2-1/2 inches. Stagger all end laps. Roll the entire surface of the membrane firmly and completely, as soon as possible after application thereof. Seal all tee joints at the end of each working day. Seal all daily terminations, and permanent terminations with manufacturer's recommended sealant material.
- C. After application of membrane is completed, carefully inspect the entire waterproofed surface for defects therein. Patch tears and inadequately lapped seams with membrane material. Slit fishmouths, repair with a patch extending at least 6 inches in all directions from the slit, and seal all edges of the patch with manufacturer's recommended sealant.
- D. Arrange for inspection of waterproofing system by representative of waterproofing manufacturer, prior to installation of insulation and backfill. Schedule and sequence manufacturer's inspection in manner to prevent delays in construction schedule.

3.5 INSTALLATION OF ACCESSORIES

- A. Application - Drainage Composite Board (Vertical Application).

1. Apply drainage composite board in an manner acceptable by the membrane manufacturer and as recommended by the composite board manufacturer and following the general guidelines specified herein.
2. Install composite drainage board on same day sheet membrane waterproofing is applied.
3. Apply first row of drainage composite board horizontally starting at base of foundation, peel fabric back approximately 12 inches from the lower edges, tuck exposed drain core behind perimeter subdrainage pipe installed under Section 33 46 00 - SUBDRAINAGE and wrap fabric over pipe.
4. Adhere drainage composite to membrane as recommended by membrane manufacturer.
5. Apply subsequent rolls of drainage composite butted tightly to previous row, overlapping fabric over next lowest row.
6. At inside corners, cut backing but not fabric. At outside corners cut backing and fabric and overlay with second layer of fabric, adhered.
7. Terminate composite board system at 6 inches below finish grade.
8. Patch or replace any damage to fabric prior to backfilling.

3.6 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the general provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Manufacturer Services: Submit to Architect manufacturer's final acceptance report following inspection of installed waterproofing within 14 calendar days following inspection.

3.7 CLEANING

- A. Clean all finished surfaces which have been damaged by the work of this Section.

3.8 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
- B. Protect applied sheet membrane waterproofing and composite drainage board fabric from damage by other trades, construction materials or backfill.

End of Section

Section 07 16 13

POLYMER MODIFIED CEMENT WATERPROOFING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 01.

1.2 SUMMARY

- A. Prepare surfaces and repair cracks in substrate scheduled to receive waterproofing.
- B. Furnish and install cementitious waterproofing at walls and floor of elevator pits.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.

- F. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete work including imbedding pre-molded water stops and requirements for finish.
- G. Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING TRADE
CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM B 117 - Salt Spray Resistance.
 - 2. ASTM C 67 - Methods of Sampling, and Testing Brick and Structural Clay Tile.
 - 3. ASTM C 109 - Compressive Strength.
 - 4. ASTM C 190 - Tensile Strength.
 - 5. ASTM C 348 - Flexural Strength.
 - 6. ASTM C 469 - Modulus of Elasticity.
 - 7. ASTM C 531 - Coefficient of Thermal Expansion.
 - 8. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 9. ASTM E 96 - Water Vapor Transmission of Materials.
 - 10. ASTM G 26 - Accelerated Weathering.
 - 11. FS TT-P-29B - Fungus Growth Resistance.
 - 12. FS TT-P-141b - Abrasion Strength

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data and physical properties.
 - 2. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
 - 3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General

Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Exterior-Applied Products (adhesives, sealants, coatings, roofing and waterproofing materials) to demonstrate VOC compliance in accordance with CARB 2007 SCM for Architectural Coatings and SCAQMD Rule 1168 – July 1, 2005.

1.6 QUALITY ASSURANCE

- A. Waterproofing applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
- B. Make all necessary arrangements with the respective waterproofing systems manufacturer to provide qualified supervision at the site, commencing immediately prior to the first application of materials, and continuing until completion of the application all waterproofing materials. Perform all preparation, mixing, and application procedures as recommended by each manufacturer's representative. Bear all costs in conjunction with such supervision.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store waterproofing materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.
- B. Store all materials in an elevated, dry location, protected by waterproof coverings. Following manufacturer's recommended storage procedures for humidity and temperature conditions, protect materials from freezing.

1.8 PROJECT CONDITIONS

- A. Maintain ambient temperatures above 40 degrees Fahrenheit for 24 hours before and during application and until liquid or mastic accessories have cured.
- B. Water saturated substrates scheduled to receive waterproofing must be fully dried and areas of active water leakage must be repaired prior to application of waterproofing.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS WATERPROOFING

- A. Acceptable Manufacturers and Products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work include the following, or approved equal:
 - 1. Five Star Products, Inc., Fairfield, CT, product "Five Star High Performance Waterproofing No. 10100".
 - 2. Silpro Masonry Systems, Inc., Ayer, MA, product "Seal Cote".
 - 3. Thoro System Products, Shakopee, MN, product "ThoroSeal".
- B. Cementitious waterproofing system meet the following minimum requirements:

Properties	Test	Results
Bond Strength:	ASTM C 882	2,000 psi
Tensile Strength:	ASTM C 190	7 day: 250 psi (17.6 kg/cm ²) 28 day: 440 psi (30.9 kg/cm ²)
Flexural Strength:	ASTM C 348	7 day: 360 psi (25.3 kg/cm ²) 28 day: 1,030 psi (72.4 kg/cm ²)
Modulus of Elasticity:	ASTM C 469	2.72 x 10 ⁶ psi
Adhesion Strength:	Tensile bond	418 psi. (29 kg/cm ²)
Compressive Strength:	ASTM C 109	1 day: 4,000 psi (280.8 kg/cm ²) 7 days: 6,300 psi (442.4 kg/cm ²)
Coefficient of Thermal Expansion:	ASTM C 531	6.99 x 10 ⁻⁶ in/in°F
Accelerated Weathering:	ASTM G 26	5,000 hours, pass with no change
Fungus Growth Resistance:	FS TT-P-29B	Meets all requirements
Abrasion Strength:	FS TT-P-141b	Passed
Permeability:	ASTM E 96	7.8 perms
Water Absorption:	ASTM C 67	3.6 percent (24 hours boiling test)
Salt spray resistance:	ASTM B 117	No deterioration or loss of adhesion

- C. Joint filler, and other installation accessories: As recommended by the waterproofing manufacturer.
- D. Portland cement plaster to be mixed with waterproofing: As recommended by the waterproofing manufacturer
- E. Water: Clean and fresh without contaminates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify substrate surfaces are durable; free of frozen matter, dampness, loose particles, cracks, pits, projections, or foreign matter detrimental to adhesion or application of waterproofing system.
 - 2. Verify that substrate surfaces are smooth, free of pitting, and not detrimental to full contact bond of waterproofing materials.
 - 3. Verify that items which penetrate surfaces to receive waterproofing are securely installed.
- B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.

- B. Thoroughly remove all previously applied coatings. Clean walls by high pressure - wash or sand blast, and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
- C. New concrete surfaces to receive waterproofing must cure a minimum of 14 days prior to application of waterproofing materials.
- D. Do not apply waterproofing to surfaces unacceptable to applicator or manufacturer. Perform a bond test as recommended by manufacturer if applicator has any doubt about the suitability of substrate.
- E. Cut out and place a cove of hydraulic cement at wall and floor junction.
- F. Repair cracks, breaks, voids, honeycombing larger than 1/32 inch width with hydraulic cement.
- G. Seal dynamic joints with backer rod and sealant materials using depth to width ratio as recommended by sealant manufacturer.

3.3 APPLICATION

- A. Dampen substrate to prevent surface drag of application.
- B. Apply waterproofing material in accordance with manufacturer's instructions by trowel, brush or broom to substrate surfaces. Ensure first coat is well brushed into substrate.
 - 1. Apply a minimum of two thick coats to a total thickness of 1/16 inch.
 - 2. Allow first coat to set a minimum of 4 hours prior to application of second coat. Moisten first coat with fine spray of water before applying second coat.
- C. Ensure there are no pinholes, voids or uncovered areas.
- D. Apply extra thickness of waterproofing material at corners, intersections, and angles.
- E. Seal watertight, items projecting through waterproofing.

End of Section

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Section 07 21 00
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of building insulation where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following scope.
- B. Furnish and install the following:
 - 1. Rigid insulation at foundation walls, under slabs, and elsewhere as indicated.
 - 2. Fiberglass batt insulation at exterior stud wall cavities and spandrel beams.
 - 3. Semi-rigid mineral wool insulation at exterior wall spandrel glass and insulated panels.
 - 4. Other building insulation work as may be called for on Drawings and not indicated or specified to be included under other Sections.
 - 5. Mineral wool insulation at hollow metal frame and overhead door perimeter for installation under Section 06 10 00 – ROUGH CARPENTRY.
 - 6. Mineral wool insulation at curtain wall voids between insulated metal panel, spandrel glass and aluminum infill for installation under Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS.
 - 7. Mineral wool insulation infill at deck flute penetration through exterior walls.
 - 8. Low pressure, low expansion polyurethane foamed-in-place insulation / air barrier sealant: applied to seal gaps, cracks, cavities and joints in the building envelope, at door frames, perimeter of window frames, and other similar penetrations in exterior walls not specified to be installed under other Sections.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 04 20 00 – UNIT MASONRY: Rigid insulation in cavity walls.
- H. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, nailers.
- I. Section 06 16 00 - SHEATHING: Wall sheathing at masonry veneer walls.
- J. Section 07 26 00 - VAPOR RETARDERS:
 - 1. Vapor barriers and in walls, floor assemblies and roof assemblies.
 - 2. Vapor barrier, seam tape, pipe boots, detail strip for installation under concrete slabs.
- K. Section 07 27 13 - MODIFIED BITUMINOUS MEMBRANE AIR BARRIERS: Self-adhesive elastomeric sheet membrane air barrier system.
- L. Section 07 42 43 – COMPOSITE WALL PANELS: Semi-rigid mineral wool insulation system behind MCM-faced panel system construction assembly.
- M. Section 07 46 46 – FIBER CEMENT SIDING: Semi-rigid mineral wool insulation system behind fiber cement siding construction assembly.
- N. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING: Roof insulation.
- O. Section 09 81 00 - ACOUSTICAL INSULATION: Acoustical batt insulation between framing members.
- P. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Ductwork and piping insulation.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01420 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 203 - Breaking Load and Flexural Properties of Block Type Thermal Insulation.
 - 2. ASTM C 518 - Thermal Transmission Properties by Means of the Heat Flow Meter.
 - 3. ASTM C 578 - Preformed Cellular Polystyrene Thermal Insulation.
 - 4. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.

5. ASTM E 136 - Behavior of Materials in a Vertical Tube Furnace at 750°C.
6. ASTM E 84 - Surface Burning Characteristics of Building Materials.
7. ASTM E 96 - Water Vapor Transmission of Materials.
8. All applicable federal, state and municipal codes, laws and regulations for thermal insulation.

B. Definitions:

1. The term "R-Value" referred to herein is intended to mean the thermal resistance of the insulation alone and does not allow consideration of air spaces or other contributing factors.

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Ceiling and Wall Systems (gypsum board products, insulation, acoustical ceiling systems and wall coverings) to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: SCS Indoor Advantage Gold; UL Greenguard Gold.
 - f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 2. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. Storage and Handling Requirements:
1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - a. Rigid board insulation materials are combustible and may constitute a fire hazard, do not expose insulation materials to open flames or other ignition sources, comply fully with manufacturer's recommendations and the requirements of local authorities having jurisdiction, for delivery, handling, storage and installation.
 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
- C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in packages containing water marks, or show evidence of mold.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Rigid insulation board (extruded polystyrene):
 - a. Dow Chemical Corp., Midland MI.
 - b. Owens Corning Commercial Insulation, Toledo OH.
 - c. Kingspan Insulation LLC; Atlanta, GA.
 - d. DiversiFoam Products, Rockford, MN
 2. Mineral fiber insulation:
 - a. Johns Manville, Inc., Denver CO.
 - b. Roxul, Inc., Milton, Ontario. (Roxul).
 - c. Thermafiber Inc., Wabash IN. (Thermafiber)
 3. Glass fiber batt/blanket insulation:
 - a. CertainTeed Corporation, Valley Forge PA.
 - b. Johns Manville Building Insulation, Denver CO
 - c. Owens Corning Fiberglas Corp., Toledo OH.
 - d. (Goldline brand) Schuller International, Inc., Denver CO.
 - e. USG Corp./ USG Interiors Inc., Chicago IL.

2.2 MATERIALS

- A. Under-slab and foundation insulation, rigid extruded polystyrene insulation: Closed cell foam board, square edge, self-extinguishing, conforming to ASTM C 578, Type IV, with a compressive strength of 25 pounds per square inch when tested in accordance with ASTM D 1621 equal to Dow Chemical Corp., Styrofoam Brand "Square Edge" insulation.
1. Thickness: 2 inches.
 2. Panel size: 48 by 96 inches beneath slab, and 24 by 96 inches at verticals.
 3. R-value: 10.
 4. Acceptable products include but are not limited to:
 - a. Dow Chemical Corp., product, Styrofoam Brand "Square Edge"
 - b. Owens Corning, product "Formular 250".
 - c. Kingspan Insulation LLC, product "GreenGuard Type IV 25 PSI Insulation Board".
 - d. DiversiFoam Products, product "CertiFoam 25 SE".
- B. Semi-rigid mineral wool insulation: Mineral wool fiber insulation board, conforming to ASTM C612, Type IVB having a nominal density of 4.4 pounds per cubic foot.
1. Non-Combustible as tested per ASTM E-136.
 2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
 3. Thermal Resistance: ASTM C518 (C177), R-value of 4.2 per inch.
 4. Thickness: As indicated on Drawings.
 5. Acceptable products include the following or approved equal:
 - a. Roxul, Inc., Milton, Ontario, product "CavityRock".
 - b. Owens Corning, Wabash IN, product "Thermafiber, RainBarrier 45."
 - c. Johns Manville, Inc., Denver CO. product: "MinWool Curtainwall CW4".
- C. Thermal batt/blanket glass fiber insulation conforming to ASTM C-665 Type I, un-faced, comprised of inorganic fibers bonded with formaldehyde-free thermosetting resin.
1. Surface burning characteristics when tested per ASTM E84:
 - a. Flame Spread: 25 or less.
 - b. Smoke Developed: 50 or less.
 2. Thicknesses and R-values:
 - a. Walls:
 - 1) Nominal 6-1/4 inch thick [159 mm] with R-19 thermal rating.
 3. Recycled content of glass in glass fiber insulation: Use maximum available percentage of recycled glass. Fiberglass insulation products incorporated into the work shall contain not less than 20 percent of recycled glass cullet.
- D. Foamed-in-place insulation for air barrier sealant: Low pressure polyurethane foam sealant. Acceptable products include the following or approved equal:

1. Fomo Products, Inc., product: "Handi Foam" or "Handi-Seal".
2. Dow Chemical Company, product: "Great Stuff Pro".
3. Premier industrial Supply, product: "XtraFoam".
4. Convenience Products, Division of Clayton Corp., product: "Touch 'n Foam No Warp".
5. Henry Company, product: "NailTite NT-100".

2.3 ACCESSORIES

- A. Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each insulation type.
- B. Adhesive attached spindle anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
 1. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch, minimum 2 inches square.
 2. Pin: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.
 3. Adhesive, as recommended by anchor manufacturer for substrate.
 4. Acceptable products include the following, or approved equal to:
 - a. Gripnail Corporation, East Providence, RI, product "SnapStik Spindle Anchors".
 - b. Gemco, Danville, IL, product "Perforated Base Insulation Hangers."
 - c. AGM Industries, Brockton, MA. product: Tactoo Insul-Hangers."
- C. Wire Insulation Supports: 13 gauge spring type wire with sharp ends designed to hold batt insulation in place between framing. Provide wire lengths based on framing spacing.
- D. Adhesive for rigid insulation: Conforming with ASTM C-557-65T, equal to W.W. Henry Company, Huntington Park CA., product "118 - Foam Insulation Adhesive".

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Insulation beneath slabs-on-grade and exterior of foundation walls: 2 inch thick rigid insulation.
 1. Place insulation boards at the exterior perimeter of foundation walls and beneath slabs-on grade.
 - a. At exterior perimeter of foundation walls, extend insulation from 2 inches below grade to top of footing.
 - b. Beneath slabs-on-grade, extend insulation to provide 100 percent coverage beneath slab.
 2. Butt edges and ends tight to adjacent boards. Bevel insulation to allow snug fit at cants.

3. Place soil as a perimeter restraint to minimize movement of insulation.
- B. Batt and blanket insulation between framing members:
1. Install in accordance with manufacturer's instructions. Do not compress or "stuff" insulation into voids, compressed insulation has less thermal resistant value.
 2. Trim insulation neatly to fit spaces. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation, do not cut around electrical boxes. Leave no gaps or voids.
 3. Where insulation is located between overhead framing and is not to be covered, install wire insulation supports to keep insulation in place.
- C. Batt insulation using spindle type anchors:
1. Install spindle type anchors at 12 inches on center in accordance with manufacturer's instructions using recommended adhesive.
 - a. Thickness of Adhesive should be between 1/23 and 1/16 inch minimum.
 - b. Install baseplate into adhesive; adhesive should protrude through baseplate perforations and beyond edges of base plate.
 - c. Permit spindle adhesive to fully cure before installation of insulation.
 - d. Before installation of insulation, pull, pry or otherwise test sample random anchors to ensure they are fully adhered. Replace all failed anchors.
 2. Install insulation in accordance with manufacturer's instructions, with spindle passing through insulation. Secure in place with self locking washers, do not compress insulation. Fit insulation tight to adjacent batts, edge materials and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids
- D. Foamed-in-place insulation / air barrier sealant: Apply insulation in method to a uniform monolithic density without voids, in accordance with manufacturer's instructions.
1. Apply application of foam for air barrier seal includes, but is not limited to:
 - a. Door frames, window frames, and similar penetrations in exterior walls.
 - b. Gaps, cracks, cavities and joints in the building envelope, not sealed with other forms of air boots, including electrical boxes and conduit, ducts, fans, and piping.
 - c. Where additionally indicated on Drawings.
- 3.2 CLEANING
- A. Clean work under provisions of Section 01 73 00 – EXECUTION.
 - B. Daily clean work areas by sweeping and disposing of debris, and scraps.
 - C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

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Section 07 26 00
VAPOR RETARDERS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract: As provided under Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING Trade Contract REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 01.

1.2 SUMMARY

- A. The work of this Section consists of vapor retarders (vapor barriers) where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
 - 1. Sheet membrane vapor barriers (vapor retarders) under concrete slabs-on-grade including seam tape, pipe boots and termination mastic.
 - 2. Mastic coating at steel columns imbedded in concrete interior and exterior.
 - 3. Termination bars.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.

- D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete slabs on grade.
- H. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, nailers.
- I. Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- J. Section 07 21 00 - THERMAL INSULATION: Thermal insulation.

1.4 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D 570 - Water Absorption of Plastics.
 - 2. ASTM D 1004 - Initial Tear Resistance of Plastic Film and Sheeting.
 - 3. ASTM D 1622 - Apparent Density of Rigid Cellular Plastics.
 - 4. ASTM D 1938 - Tear Propagation Resistance of Plastic Film and Thin Sheeting by a Single-Tear Method.
 - 5. ASTM D 2842 - Water Absorption of Rigid Cellular Plastics.
 - 6. ASTM D 2582 - Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
 - 7. ASTM D 2856 - Open Cell Content of rigid Cellular Plastics by Air Pycnometer.
 - 8. ASTM E 136 - Behavior of Materials in a Vertical Tube Furnace at 750°C.
 - 9. ASTM E 154 - Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 - 10. ASTM E 1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 11. ASTM E 1745 - Plastic Vapor Retarders Used in Contact with Soil or Granular fill under Concrete Slabs
 - 12. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 13. ASTM E 96 - Water Vapor Transmission of Materials.
- B. General References: The following reference materials are hereby made a part of this Section by reference thereto:
 - 1. ACI 302.1R Vapor Barrier Component (plastic membrane) is not less than 10 mils thick.

2. NFPA 701 - Fire Tests for Flame Resistant Textiles and Films
3. All applicable federal, state and municipal codes, laws and regulations for thermal insulation and vapor barriers.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing: Coordinate work of this section with related work.

1.6 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Manufacturer's Instructions: Manufacturer's installation instructions for placement, seaming and pipe boot installation.
3. Submit a letter of compatibility with underslab vapor barrier.
4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.

2. Store materials under cover and in manner to keep them dry, protected from weather, direct sunlight and damage from construction traffic and other causes.

1.8 QUALITY ASSURANCE

- A. Manufacturer's On-site Inspections: Make arrangements to have Manufacturer's representative (employed by manufacturer) be present on-site during the Work of this Section at key points, which include, but are not limited to:
 1. Pre-installation conference.
 2. Review of installation procedures (a minimum of 3 site visits are required; including one on first day of installation).

PART 2 - PRODUCTS

2.1 UNDER SLAB VAPOR BARRIERS

- A. Manufacturers:
 1. Specified Product (Basis of Design): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Stego Industries LLC company, Product: "Stego Wrap (15 mil)".
 2. Acceptable manufacturers: Subject to compliance with the requirements specified herein, products which may be incorporated in the work include the following. No substitutions will be accepted.
 - a. Stego Industries LLC, San Juan Capistrano, CA, product: "Stego Wrap (15 mil)".
 - b. W.R. Meadows, Hampshire, IL, product: "No. 723 Perminator (15 mil)".
 - c. Reef Industries, Houston, TX, product "Griffolyn -15 Mil Green".
- B. Under slab vapor barrier:
 1. Vapor barrier must have the following qualities.
 - a. Minimum thickness: 15 mils.
 - b. Permeance complying with ACI 302.2R.
 - c. Permeance after conditioning when tested in accordance with ASTM E 1745 (where applicable): Less than 0.01 perms (gr/ft²/hr/in-Hg).
 - d. Water vapor barrier tested by ASTM E-1745: Meets or exceeds Class A.

2.2 ACCESSORIES

- A. General: Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each type of vapor barrier.
- B. Air seal boot: PVC or EDPM premolded pipe and seal for penetrations at vapor barrier.
- C. Seam Tape: High Density Polyethylene Tape or HDPE Tape as recommended by vapor barrier manufacturer, with pressure sensitive adhesive. Minimum width 4 inches.

- D. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.
- E. Termination mastic: VOC compliant mastic with for use in sealing vapor barrier terminations and punctures, as recommended by vapor barrier manufacturer.
- F. Termination bars: 1/8 inch by 1 inch, ¼ inch holes spaced 8 inches on center, Type 304 stainless steel.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ensure that subsoil is approved by Architect.
- B. Level and tamp or roll aggregate, sand or tamped earth base.
- C. Contact vapor barrier manufacturer to schedule a preconstruction meeting and to coordinate an in-person review of the vapor barrier first installation prior to concrete pour.

3.2 INSTALLATION - BELOW-SLAB VAPOR BARRIERS/RETARDERS

- A. General: Install vapor barrier in accordance with manufacturer's instructions and ASTM E 1643–98. Place vapor barrier beneath all floor slabs
- B. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.
- C. Lap vapor barrier over footings and seal to foundation walls.
- D. Overlap joints a minimum of six inches with top lap in direction of spreading concrete. Turn up double layer at slab edges abutting walls. Seal with manufacturer's tape.
- E. Seal all penetrations (including pipes, reinforcing steel, and permanent utilities) with manufacturer's pipe boot or vapor barriers recommended detail. Penetrations from temporary formwork shall also be sealed.
- F. Do not puncture vapor barrier. No punctures or unsealed penetrations are permitted.
- G. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.

End of Section

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Section 07 27 13
MEMBRANE AIR BARRIERS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 01)

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this TRADE CONTRACT includes all individual specification sections listed in Section 07 00 01.

1.2 SUMMARY

- A. The work of this Section consists of air and vapor membrane system where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
1. Self-adhesive elastomeric sheet membrane air and vapor barrier system, including specified sheet membrane, required primers and adhesives.
 2. Transition membrane flashing and sealant at all penetrations and expanding / deflection joints through the air vapor barrier membrane system not specified in other sections including but not limited to:
 - a. Wall air and vapor barrier membrane terminations.
 - b. Roof expansion joints where noted.
 - c. Wall expansion joints.
 - d. Connections to adjacent systems (unless specifically noted to be performed under another Section.
 - e. Structural penetrations through wall air and vapor barrier membrane.
 - f. Hollow metal door frame air barrier transitions.
 - g. Exterior overhead door perimeters.
 3. Mock-up elements for field panel.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will

be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCK-UPS: Requirements for free-standing exterior mock-up assembly requiring work of this Section.
- B. Section 01 45 29 – TESTING LABORATORY SERVICES: Independent laboratory testing included as part of the work of this Section.
- C. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- D. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- G. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- H. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete walls substrate to receive work of this Section 07 27 13.
- I. Section 04 20 00 - UNIT MASONRY:
 - 1. Masonry substrate to receive work of this Section 07 27 13.
 - 2. Masonry cavity walls/flashing.
- J. Section 06 16 00 - SHEATHING: Wall sheathing substrate to receive the work of this Section 07 27 13.
- K. Section 07 00 01 - WATERPROOFING, DAMPPROOFING AND CAULKING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- L. Section 07 21 00 - THERMAL INSULATION:
 - 1. Furnishing cavity wall insulation.
 - 2. Spray foam insulation.
- M. Section 07 26 00 - VAPOR RETARDERS: Vapor barrier, seam tape, pipe boots, detail strip for installation under concrete slabs.
- N. Section 07 42 43 - COMPOSITE WALL PANELS: Composite wall panel system with related flexible membrane flashing
- O. Section 07 46 46 – FIBER CEMENT SIDING: Fiber cement siding system with related flexible membrane flashing
- P. Section 07 54 19 – POLYVINYL-CHLORIDE (PVC) ROOFING: Coordination of transitions between roofing and air barrier system.

- Q. Section 07 92 00 - JOINT SEALANTS: Requirements for joint sealant and backing materials.
- R. Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES: Hollow metal frames to receive transition flashing installed under this Section.
- S. Section 08 33 23 – OVERHEAD COILING DOORS: Overhead coiling door assembly to receive transition flashing installed under this Section.
- T. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Entrance doors, frames, vestibule and storefront framing, and transition flashing membranes.
- U. Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS: Aluminum framed glazed curtain wall system and transition flashing membranes.
- V. Section 08 45 13 - FIBERGLASS SANDWICH PANEL ASSEMBLIES: Fiberglass panel assemblies and framing, and transition flashing membranes.
- W. Section 08 51 13 - ALUMINUM WINDOWS: Custom head, jamb and sill extrusions, and transition flashing membranes.
- X. Section 08 63 00 – METAL FRAMED SKYLIGHTS: Custom skylight framing, and transition flashing membranes.

1.4 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 920 Standard Specification for Elastomeric Joint Sealants
 - 2. ASTM C 1305 Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane
 - 3. ASTM D 412 - Test Methods for Vulcanized Rubber & Thermoplastic Rubbers and Thermoplastic Elastomers – Tension.
 - 4. ASTM D 570 - Test Method for Water Absorption of Plastics.
 - 5. ASTM D 882 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
 - 6. ASTM D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - 7. ASTM D 1004 - Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
 - 8. ASTM D 1876 Standard Test Method for Peel Resistance of Adhesive
 - 9. ASTM D 1938 - Test Method for Tear Propagation Resistance of Plastic Film and Thin Sheeting by a Single-Tear Method.
 - 10. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep slope roofing Underlayment for Ice Dam Protection
 - 11. ASTM D 4073 Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes

12. ASTM D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
13. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
14. ASTM E 96 - Test Methods for Water Vapor Transmission of Materials.
15. ASTM E 154 - Test Method for Water Vapor Retarders used in contact with Earth Under Concrete Slabs, on Walls or as Ground Cover.
16. ICC ES (ICC Evaluation Service) AC48 – Acceptance Criteria for Roof Underlayment for Use in Severe Climate Areas.
17. NFPA 285 (National Fire Protection Association): Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Pre-installation meetings specified under related specifications:
 1. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 – UNIT MASONRY.

1.6 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties.
 - a. Include certification of data indicating Volatile Organic Compound (VOC) content of all components of waterproofing system.
 2. Shop Drawings:
 - a. Show the locations and extent of air and vapor barrier system including details of typical conditions including:
 - 1) Intersections with other envelope systems and materials.
 - 2) Membrane counter-flashings.
 - 3) Bridging of gaps.
 - 4) Penetrations through barrier including conduits, pipes and similar items.
 3. Verification Samples:
 - a. Self-adhered air and vapor barrier membrane.
 - b. Membrane transition flashing.
 - c. Detail flashing.
 4. Test and Evaluation Reports:

- a. Provide an Evaluation Report as the manufacturer's documentation confirming material has been evaluated and conforms to the requirements of the ASTM E2176 Standard for Air Barrier Materials.
 - b. Provide an Evaluation Report as the manufacturer's documentation confirming material has been evaluated and conforms to the requirements on NFPA 285 based on the various exterior wall configurations of this project.
 5. Manufacturer's Instructions:
 - a. Manufacturer's application instructions including data for surface conditioners, joint and crack treatment and application temperature range.
 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
- 1.7 QUALITY ASSURANCE
- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of air barrier system.
- 1.8 MOCK-UPS
- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
 - B. Provide mock-up areas using air and vapor membrane system, minimum 200 square feet, demonstrating the minimum standard for the Work.
 - C. Locate mock-ups where directed and include all materials which are part of the air and vapor system. Incorporate as part of the mock-up area, substrate, window frame, attachment of insulation, and showing air and vapor barrier application details.

- D. Allow 72 hours for inspection of mock-up by Architect before proceeding with air/vapor barrier work. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver and store waterproofing materials in new, sealed, containers showing manufacturer's identification, year of production, net weight, date of packaging, and location of packaging.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - a. Protect primers, mastic and adhesives from high heat, flames or sparks.
 - 2. Store all materials in an elevated, dry location, protected by waterproof coverings. Following manufacturer's recommended storage procedures for humidity and temperature conditions, protect materials from freezing.

1.10 SITE CONDITIONS

- A. Maintain ambient temperature above 30 degrees Fahrenheit for 24 hours or as recommended by the manufacturer before, during, and after installation until liquid or mastic accessories have cured.

1.11 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty:
 - 1. Provide 5 year Manufacturer's product warranty which shall include replacement of defective materials.
 - a. Warranty shall include provisions for coverage of the following:
Membrane will bridge ruptures caused by cracking of the immediate substrate up to 1/16 inch width.
- C. Special Warranty:
 - 1. Provide 2 year Applicator's warranty or bond which shall include removal and replacement of defective materials, and repairs or replacement of Owner's materials and products damaged due to failure of waterproofing installation to resist water or moisture penetration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Carlisle Coatings & Waterproofing Inc., Wylie, TX, product "Fire Resist™ 705 VP".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Carlisle Coatings & Waterproofing Inc., Wylie, TX. (Carlisle).
 - 2. Henry Company, Inc., Huntington Park, CA. (Henry).
 - 3. W.R. Grace & Co., Construction Products Division, Cambridge, MA. (Grace).
 - 4. Tremco, Inc., Beachwood, OH. (Tremco).

2.2 PERFORMANCE/DESIGN CRITERIA

- A. General: The air and vapor barrier shall have the following characteristics:
 - 1. Continuous with all joints made airtight.
 - 2. Air permeability not to exceed 0.002 L/s*m² under a pressure differential of 75 Pa. when tested in accordance with ASTM E 2178.
 - 3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
 - 4. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Transition connections shall be made between the following:
 - a. Foundation and walls.
 - b. Walls and windows or doors.
 - c. Different wall systems.
 - d. Wall and roof.
 - e. Wall and roof over unconditioned space.
 - f. Walls, floor and roof across construction, control and expansion joints.
 - g. Walls, floors and roof to utility, pipe and duct penetrations.
 - 5. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.
 - 6. Membrane transition flashing and termination sealant to be installed at all locations where shown and noted on the drawings to be by this Section.

2.3 MATERIALS

- A. Product shall consist of nominal 0.023 inch (23 mils) thickness composite membrane consisting of an aluminum-faced cross-laminated high-density polyethylene sheet laminated with a styrene-butadiene-styrene modified asphalt adhesive.

1. Performance requirements:

REQUIREMENT	RESULT	TEST METHOD
Air Permeance	Not more than 0.002 L/s*m ² at 75 Pa (0.004 CFM/ft ² at 1.57 PSF)	ASTM E-2178
Tensile Strength	Not less than 40 lb _f per inch	ASTM D-882
Puncture Resistance	Not less than 50 lb _f	ASTM E 154
Tear Initiation and Propagation	Not less than 30 lb _f , machine direction and cross direction	ASTM D 4073
Low Temperature Flexibility	No cracking at minus 20 degrees F, 1 inch mandrel	ASTM D 1970
Fastener Sealability	No water leaking through fastener penetration after 24 h.	ASTM D 1970
Water Resistance	Membrane specimen including a lap shall resist a 55 cm (22 inch) column of water for 5 hours, no leaking or wet through.	AATCC-127, modified static head generated with 5" diameter PVC pipe sealed to specimen
Pull Adhesion	Not less than 16 lb _f per square inch (or report value at substrate failure) on glass-faced gypsum sheathing and concrete masonry unit, substrate prepared with contact adhesive	ASTM D 4541, modified 4 inch puck
Lap Adhesion	Not less than 1 lb _f per inch of width	ASTM D 1876
Water Vapor Permeance	Not less than 10 perms	ASTM E-96, Method B
Surface Burning Characteristics.	Flame Spread Index: Not more than 25 Smoke Generation Index: Not more than 450	ASTM E 84, sample tested at full coverage, cement board substrate, including surface preparation"

2.4 Accessories: Provide from same manufacturer as air barrier membrane.

- A. Detail Flashing: Similar composition to air barrier membrane. Factory slit to convenient sizes.
 - 1. Carlisle Waterproofing, Wylie, TX product "Aluma-Grip 701"
 - 2. Others: As specified by air barrier membrane manufacturer.
- B. Membrane Transition Flashing:
 - 1. Preformed Silicone-Sealant Extrusion / Transition Strip System:
 Manufacturer's standard preformed extruded pre-engineered pre-cured, low-modulus silicone-rubber extrusion, sized to fit opening widths, with a single-component, neutral-curing, 40 durometer. Class 100/50 (low-modulus) translucent silicone sealant for bonding extrusions to substrates.

- a. Basis of Design: Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Proglaze ETA, Connections."
 - 1) Width: As required by field conditions.
 - 2) Acceptable Products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a) Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Proglaze ETA, Connections.
 - b) Dow Corning Corporation, Midland MI, product: "123 Silicone Seal".
 - c) Pecora Corporation, Harleysville PA, product: "XL-Span".
 - d) Elbex Corporation, Kent, OH, product "Elbex HS222" (0.030 inch thick).

- C. Sealants and primers as recommended by transition flashing manufacturer and compatible with adjacent materials. Provide letters of compatibility from each manufacturer as required.

- D. Lap Sealant: Manufacturer's two-part, elastomeric, trowel-grade material designed for use with self-adheredc membranes and tapes 10 g/l max VOC content.

- E. Lap Sealant assemblies to receive silicone sheet transition membranes.

- F. Silicone sealant compatible with rubberized asphalt, and approved by both the sealant manufacturer and air barrier manufacturer for use as a lap sealant.
 - 1. Acceptable Products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Spectrem I".
 - b. Dow Corning Corporation, Midland MI, product "Dow 795 Silicone Building Sealant".
 - c. Pecora Corporation, Harleysville PA, product: "AVB Silicone Sealant".
 - d. Carlisle Coatings & Waterproofing Inc., Wylie, TX, product ""Barribond Liquid Flashing and Detail Sealant".

- G. Contact Adhesive: Liquid or spray-applied for preparing surfaces accepting air barrier membrane.
 - 1. Others: As acceptable to air barrier membrane manufacturer.

- H. Detail Mastic: 1-part material for sealing details. Installation over air barrier membrane.
 - 1. CCW: Universal Single Ply Sealant
 - 2. Others: As specified by air barrier membrane manufacturer.

- I. Fill Compound: 2-part chemical cure sealant, compatible with adhesive side of air barrier membrane.
 - 1. CCW: CCW-703 V Modified polyurethane, 2-part or CCW-201 Polyurethane, 2-part

2. Others: As specified by air barrier membrane manufacturer.
- J. Primer: As specified by air barrier membrane manufacturer.
- K. Surface Conditioner: As specified by air barrier membrane manufacturer.
- L. Polyurethane Sealant: used for sealing membrane surface defects, penetrations and terminations :
1. Approved by CCW: Sonneborn NP-1, Dymonic FC, S-M 7100 Permthane Pro-Installer by Schnee-Morehead Div, ITW or Xtra-Bond 7500 TX by Premiere Industrial Supply
 2. Others: As specified by air barrier membrane manufacturer. Provide letter of compatibility from each manufacturer.
- M. Silicone Sealant: used for sealing surface defects and penetrations.
1. Approved by CCW: Dow-Corning 758, 790, 791 or 795 or Pecora AVB Silicone, 890, 891 or 895 or GE Silpruf or Silpruf LM
 2. Others: As specified by air barrier membrane manufacturer. Provide letter of compatibility from each manufacturer.
- N. Polyurethane Foam Sealant: used for sealing gaps around penetrations not specified to be installed under other sections.
1. Approved by CCW: Great Stuff by Dow Chemical Company, FireBlock, Gun Foam by TVM Building Products or Fireblock Foam Sealant by FOMO
 2. Others: As specified by air barrier membrane manufacturer. Provide letter of compatibility from each manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Beginning of installation means acceptance of existing substrate and project conditions.
 2. Verify items which penetrate surfaces to receive air barrier and vapor barrier are rigidly installed.
 3. Verify surfaces are free of cracks, depressions, waves, or projections which may be detrimental to successful installation.
 4. Concrete Substrates: Notify the Contractor in writing if concrete substrate requires patching of holes over 1/2 inch in diameter or length and over 1/4 inch deep, by Section 03 30 00 - CAST-IN-PLACE CONCRETE. Do not proceed until patching is completed.
 5. Concrete Masonry Substrates: Notify the Construction Manager in writing if concrete unit masonry substrate requires filling of voids and holes greater than 1/2 inch, gaps and joints exceeding 1/4 inch, or surface irregularities greater than 1/4 inch, or other corrections required by Section 04 20 00 – UNIT MASONRY, for application of air barrier over concrete unit masonry.
 6. Do not apply air barrier and vapor barrier system to damp, frozen, dirty, dusty or surfaces unacceptable to membrane manufacturer.

3.2 PREPARATION

- A. Perform all preparation work on receiving surfaces as required, including removal of fins, scaling, and projecting rough spots. Remove all dirt, oil, and other foreign matter from the concrete surfaces. Clean substrate surfaces (broom, vacuum or compressed air) to remove dust, loose stones and debris.
- B. All masonry joints shall be filled and struck flush with the face of masonry and limestone, using a 3:1 mix of sharp sand and Portland cement mixed with a one part bonding agent to five parts water, and allowed to cure.
- C. Apply primer as recommended by manufacturer at a rate of 250 to 350 square feet per gallon; Prime only the area which will be covered with membrane in a working day, areas not covered with membrane in 24 hours must be reconditioned.
- D. Prepare inside corners by installing a fillet of liquid membrane, latex modified cement mortar or epoxy mortar, extend 6 inches in all directions beyond the corner.
- E. Cracks and joints in substrate surface must be properly sealed with waterstop, joint filler and sealant as recommended by the sheet membrane waterproofing manufacturer.

3.3 APPLICATION

- A. Perform the application of the sheet membrane air barrier and vapor barrier system in strict accordance with the manufacturer's installation specifications, details, and recommendations, and as specified herein.
- B. Condition and prime substrate surfaces:
 - 1. When required by dirty or dusty site conditions; by surfaces having irregular or rough texture, or if it becomes difficult to adhere the air and vapor barrier to the substrate, apply surface conditioner by spray, brush, or roller at the rate recommended by manufacturer, prior to membrane installation. Allow surface conditioner to dry completely before membrane application.
 - 2. Apply a bead or trowel coat of mastic along membrane edges, seams, cuts, and penetrations.
 - 3. Apply primer by brush or heavy nap, natural-material roller at rate recommended by manufacturer prior to membrane installation. Allow primer to dry completely before membrane application.
- C. Application of Membrane:
 - 1. Precut pieces of air & vapor barrier into easily-handled lengths.
 - 2. Remove silicone-coated release paper and position membrane carefully before placing length horizontally against the surface.
 - 3. Begin installation at the base of the wall placing top edge of membrane immediately below any masonry reinforcement or ties protruding from substrate.
 - 4. When properly positioned, place against surface by pressing firmly into place. Roll membrane with extension-handled countertop roller immediately after placement.
 - 5. Overlap horizontally-adjacent pieces 50 mm (2") and roll seams.

6. Subsequent sheets of membrane applied above shall be positioned immediately below masonry reinforcement or ties. Bottom edge shall be slit to fit around reinforcing wires or ties, and membrane shall overlap the membrane sheet below by 50 mm (2"). Roll firmly into place.
7. Seal around masonry reinforcing or ties and all penetrations with termination mastic.
8. Continue the membrane into all openings in the wall, such as doors, windows, etc., and terminate at point 3 inches (minimum) beyond interior face of frame. Prevent visibility from interior locations where 3 inch termination is not possible.
9. Coordinate the installation of air and vapor barrier with roof installer to ensure continuity of membrane with rooftop air and vapor membrane.
10. At end of each working day seal top edge of air and vapor barrier to substrate with termination mastic.
11. Do not allow the rubberized asphalt surface of the air and vapor barrier membrane to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.

3.4 INTERFACE WITH OTHER WORK

- A. Coordinate the work of this Section installation of windows and door frames. Ensure air and vapor barrier transitions from windows and door frames is completed.

3.5 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the provisions of Section 01 45 00 - QUALITY CONTROL.
 1. Fully inspect air and vapor barrier installation, including transitions, prior to enclosing. Repair punctures, damaged areas and inadequately lapped seams with a patch of the membrane sized to extend 150 mm (6") in all directions from the perimeter of the affected area.
- B. Manufacturer Services: Make arrangements to have Manufacturer's representative (employed by manufacturer) on-site during work of this Section to periodically review installation procedures. A minimum of 3 site visits are required.

3.6 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris, and scraps.

3.7 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
- B. Do not expose air and vapor barrier membrane to sunlight for more than thirty days prior to enclosure.

End of Section

Section 07 42 43
COMPOSITE WALL PANELS

PART 1 – GENERAL

1.1 SUMMARY

- A. The work of this Section consists of composite panel wall systems where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
1. Rout and return metal composite material (referenced as MCM or ACM interchangeably) faced panel system including vertical walls, fascia's, and horizontal soffits.
 - a. Panels: Aluminum composite material with painted finish.
 2. Related flashing adapters, copings, trim, splines and filler components indicated as integral parts of the panel system or as designed.
 - a. MCM termination metal stiffener at termination metal and change of direction of thermally insulated façade system and locations to secure semi-rigid insulation.
 - b. MCM termination metal.
 3. Sub-assemblies, anchorages, shims, furring, fasteners, gaskets and sealant associated with the work of this Section including but not limited to vertical furring at MCM base at PVC roofing behind wood blocking.
 4. Prefinished extruded aluminum framing, retention assemblies, anchorages, shims, furring, fasteners, gaskets, and sealant associated with the work of this Section.
 5. Field testing of composite wall panel assemblies.
 6. Semi-rigid mineral wool insulation system behind MCM-faced panel system construction assembly or as otherwise noted; including semi-rigid mineral wool insulation, compatible adhesives for attachment to air/vapor barrier membrane, retention clips, flashing tape, edge sealant at joints and related accessories.
 7. Sealant at metal through wall flashing lap joint splice.
 8. Sealant at concealed fastener heads.
 9. Continuous sealant behind air barrier transition metal.
 10. Through wall flashing termination membrane and edge sealant.
 11. Air barrier transition termination membrane and edge sealant.
 12. Continuous sealant behind metal through wall flashing.
 13. Continuous sealant thermally insulated façade attachment system penetrations and horizontal joints.
 14. Mock up panel components.
 15. Thermally insulated façade attachment system.
 16. One (1) and two (2) piece metal through wall flashing. Supply second piece to Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING for installation.

17. EPDM membrane through wall flashing at expansion joints.
 18. Structural engineer stamped prepared calculations and other performance criteria for each respective system.
 19. Continuous metal air barrier transition and flashing membrane.
- C. Furnish the following items for installation under related sections:
1. Composite wall panels to be incorporated into acoustical wall panel assemblies at Auditorium installed under Section 06 40 00 – ARCHITECTURAL WOODWORK.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.
- 1.2 RELATED REQUIREMENTS
- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
 - B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
 - C. Section 01 73 00 - EXECUTION: Waste Management and Recycling during Final Cleaning.
 - D. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
 - E. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
 - F. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
 - G. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
 - H. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work.
 - I. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural wall framing.
 - J. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, framing, curbing and nailers.
 - K. Section 06 16 00 - SHEATHING: Wall sheathing behind composite wall panels.
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- L. Section 06 40 00 – ARCHITECTURAL WOODWORK: Providing acoustical wall panel system at Auditorium including MCM panels furnished under this Section.
- M. Section 07 21 00 – THERMAL INSULATION:
- N. Section 07 27 13 – MODIFIED BITUMINOUS SHEET AIR BARRIERS: Self-adhesive elastomeric sheet membrane air and vapor barrier system.
- O. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING: Membrane roofing and related insulation.
 - 1. Installation of through wall flashing component “piece 2” as furnished by this Section.
- P. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Counter flashings and cap flashing at roof.
- Q. Section 07 71 00 - ROOF SPECIALTIES: Factory fabricated and finished roof edging.
- R. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.
- S. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Entrance doors, frames, vestibule and storefront framing.
- T. Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS: Aluminum framed glazed curtain wall system.
- U. Section 08 51 13 - ALUMINUM WINDOWS.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AAMA 501 - Methods of Test for Metal Curtain Walls.
 - 2. AAMA 620 - Voluntary Specification High Performance Organic Coatings on Coil Coated Architectural Aluminum.
 - 3. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 - 4. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
 - 5. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 6. ASTM B 209 - Specification for Aluminum and Aluminum Alloy Sheet and Plate.
 - 7. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
 - 8. ASTM D 3359 - Standard Test Methods for Measuring Adhesion by Tape Tests.
 - 9. ASTM E 84 - Test Methods for Surface Burning Characteristics of Building Materials.

10. ASTM E 283 - Rate of Air Leakage through Exterior Entrance and storefront, Curtains Walls and Doors.
11. ASTM E 329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
12. ASTM E 330 Structural Performance of Exterior Entrance and storefront, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
13. ASTM E 331 - Test method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequencing:
 1. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
- C. Pre-installation Meeting: Conduct pre-installation meeting at site attended by Owner's Project Manager, Architect, manufacturer's technical representative, and other trade contractors.
 1. Coordinate building framing in relation to composite wall panel system.
 2. Coordinate installation of building air and water barrier behind composite wall panel system.
 3. Coordinate window, door and louver, and other openings and penetrations of composite wall panel system.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 2. Shop Drawings:
 - a. 1/4 inch scale elevations indicating panel jointing.
 - b. Large scale design details of wall system; indicating sizes, types, and gauges of all metal components; expansion provisions, sealant details, indicating types and thickness of bracing and stabilizing members; attachment clips and brackets; and complete installation details.

- c. Design engineering shall be the responsibility of the wall systems manufacturer; details may vary from those indicated on the Contract Drawings.
 - d. Include data indicating compliance with performance requirements.
 - e. Indicate points of supporting structure that must coordinate with composite wall panel system installation.
 - f. Submit documentation of compliance with windload criteria certified by a professional structural engineer registered in the Commonwealth of Massachusetts to Architect for submittal to the City of Worcester Building Inspector as required by the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments.
3. Selection Samples:
- a. Color samples: Architect to select custom color including colors designated by the coating manufacturer as premium or metallic colors. Up to two colors may be selected; Architect to provide color samples.
 - b. Provide physical samples as requested by Architect for initial selection of colors and finishes
 - c. Manufacturer's sample boards for sealant colors, for selections by the Architect.
4. Verification Samples:
- a. After receipt of selected colors from the Architect, submit at least two 12-inch long pieces of major metal extruded components of the systems, and 12 by 12 inch samples of finished aluminum sheet used for trim components, prefinished in the specified finish system in selected colors.
 - b. Provide 24-inch (600 mm) section of wall panel showing finishes, horizontal joinery, vertical joint return, injected core material, panel stiffener and anchoring details. Provide 12-inch (300 mm) long pieces of each extruded aluminum trim and gaskets.
5. Certificates: Indicate how design requirements for loading and other performance criteria have been satisfied.
6. Manufacturer's Instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
7. LEED Submittal Requirements:
- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - e. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
 - B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 - 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
 - b. Manufacturer's recommended maintenance data.
 - C. Provide an Evaluation Report as the manufacturer's documentation confirming material has been evaluated and conforms to the requirements on NFPA 285 based on the various exterior wall configurations of this project.
- 1.6 QUALITY ASSURANCE
 - A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - B. Qualifications:
 - 1. Manufacturers: Minimum of 10 years experience in manufacturing of composite wall panel systems.
- 1.7 MOCK-UPS
 - A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, and relationship to other work.
- 1.8 DELIVERY, STORAGE AND HANDLING
 - A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer.
 - B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water

marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.9 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Extended Correction Period: Project specific Manufacturer's written warranty for composite panel system, covering repair or replacement of any system which leaks, or exhibits defects in materials, finish, design, within 2 years from date of Project Substantial Completion. Failure due to defective materials or workmanship is deemed to include, but not to be limited to:
 - 1. Failures in operation of operating component or components.
 - 2. Leakage or air infiltration in excess of the specified standard.
 - 3. Deterioration of finish to an extent visible to the unaided eye.
 - 4. Defects which contribute to unsightly appearance, potential safety hazard, or potential untimely failure of the work of this Section or the Work as a whole.
- C. Special Finish Warranty: Provide 20 year warranty on polyvinylidene flouride enamel finish which shall include covering the applied finish against defects, including color fading, chipping, crazing, pitting, and delamination.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. 3A Composites, Mooresville, NC
 - 2. Alucoil North America, LLC. Manning, SC.
 - 3. Fairfield Metal, LLC, Fairfield, NJ.
 - 4. Alcotex, London, Ontario, CN.

2.2 DESCRIPTION

- A. System General Description: Rout and return panel system with attachment system which will allow for exterior removal of any individual panel within the erected system for damage replacement or access of structure behind the panel, without disturbing adjacent panels.
 - 1. System must provide a perimeter aluminum extrusion with integral weatherstripping as detailed on Drawings. No field sealant is required in joints except for conditions specifically indicated.
- B. System shall not have visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.

2.3 PERFORMANCE/DESIGN CRITERIA

- A. General Performance: The metal panel system including required supports, trim and sealant shall meet all regulatory requirements for wind loading, water penetration, and air leakage and in addition the following criteria.
1. Engineering criteria: The manufacturer for wall panel system shall employ the services of a qualified structural engineer, registered to practice in the Commonwealth of Massachusetts, to prepare all calculations and other performance criteria for the respective systems, and bear all costs therefor. All shop drawings for the metal components of the respective systems shall bear the registration stamp of the engineer.
 2. Dead loads: As required by applicable building code.
 3. Live Loads: As required by applicable building code.
 4. Wind Loading: Panels and installation shall be designed to conform to 2015 International Building Code (IBC) with Massachusetts Building Code, Ninth Edition amendments (780 CMR) for basic wind speed, (3 second gust), both positive (acting inward) and negative (acting outward) wind pressure loading.
 - a. Product Structural Performance: Per ASTM E72 or ASTM E330, panels and related system framing, shall have a deflection limit of $l/180$ for positive (acting inward) and negative (acting outward) pressure loading.
 - 1) Positive pressure loading shall be as determined by ASCE-7 for specified wind speed, but not less than 20 pounds per square foot, whichever is greater.
 - 2) Negative pressure loading shall be as determined by ASCE-7 for specified wind speed, but not less than 40 pounds per square foot, whichever is greater.
 - b. Fatigue testing: Panels shall show no evidence of facing/core interface delamination when panel is tested by simulating wind loads of 20 psf (positive and negative) for two million alternate cycles. Test results shall be verified by independent laboratory.
 5. Water infiltration: Static Water Infiltration (ASTM E331-83) at 15.0 psf (77.5 mph wind and 2.88" H₂O) with a water spray rate of five (5) gallons per hour per square foot minimum for 15 minutes, no uncontrolled water infiltration on roomside.
 6. Static Air Infiltration: Air/moisture barrier air infiltration shall not exceed 0.06 cfm per square foot at a pressure differential of 1.57 psf when tested in accordance with ASTM E 283.
 7. Design wall system, to withstand thermal expansion and contraction movements of component materials, without buckling, failure of joint seals, undue stress on members or fasteners, or other detrimental effects.
 8. Face-Seal system (Wet-Joint) is unacceptable. Non-compartmentalized and single filler strip systems are unacceptable. Only systems with dual filler strip with pressure equalization chamber in the reveal, and continuous venting on entire perimeter of each panel will be accepted. Performance shall be tested using ASTM E 331 (Vented Rainscreen Test) – Standard Test Method for Water Penetration of Exterior Vented Rainscreen Panel System. Results shall produce an Air Flow of 1 CFM/SF of Weather Wall Area, Without Any Water Penetration to the Interior Wall Cavity.

- B. Fire Performance Characteristics: Provide metal composite wall systems with the following fire test characteristics determined by indicated test standard as applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Surface-Burning Characteristics: Provide metal composite wall system panels with the following characteristics when tested per ASTM E 84:
 - a. Flame spread index: 25 or less.
 - b. Smoke developed index: 450 or less.
 - c. Ignition: Meeting requirements of NFPA 285.

2.4 COMPOSITE PANELS

- A. Materials:
 - 1. Aluminum Sheet: Smooth surface coil-coated sheet, ASTM B209, 3005 T5 Aluminum alloy.
 - 2. Aluminum Extrusions: ASTM B 221, 6063 T5 Aluminum.
 - 1. Panel Core: Mineral filled fire resistive core material, compliant with requirements for NFPA 285 tested assemblies, and compliant per ASTM E 84, with flame-spread index of 15 or less and smoke-developed index of 30 or less.
- B. Composite aluminum panels, as manufactured by one of the following, or approved equal. Panels shall be two sheets of 0.020 aluminum sandwiching a core of extruded thermoplastic formed in a continuous process with no glues or adhesives between dissimilar materials.
 - 1. Panel Thickness: 4mm (nominal 0.157 inch).
 - 2. Surface Texture: Smooth.
 - 3. Bond Integrity: No failure of bond between core and faces and no cohesive failure of core when tested in accordance with ASTM D 1781 at minimum of 22.5 in-lb per inch.
- C. Acceptable panels:
 - 1. 3A Composites, Mooresville, NC, product "Alucobond Plus/ FR".
 - 2. Alucoil North America, LLC. Manning, SC, product "Alucoil Larson/ FR".
 - 3. Fairfield Metal, LLC, Fairfield, NJ, product "Vitrabond FR".
 - 4. Alcotex, London, Ontario, CN, product "Alcotex/ FR".

2.5 TRACK SYSTEM

- A. Aluminum Track System: Extruded aluminum ASTM B221, alloy 6063-T6 or alloy 6061-T6 track system designed for joint width indicated on the Drawings with an extruded aluminum retainer. Metal to metal sliding joints are not permitted.

2.6 INSULATION

- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Johns Manville, Inc., Denver CO.

2. Roxul, Inc., Milton, Ontario. (Roxul).
 3. Thermafiber Inc., Wabash IN. (Thermafiber).
- B. Semi-rigid mineral wool insulation: Mineral wool fiber insulation board, conforming to ASTM C612, Type IVB having a nominal density of 4.4 pounds per cubic foot.
1. Non-Combustible as tested per ASTM E-136.
 2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
 3. Thermal Resistance: ASTM C518 (C177), R-value of 17 minimum at 4 inches thick.
 4. Thickness: 4 inches.
 5. Acceptable products include the following or approved equal:
 - a. Roxul, Inc., Milton, Ontario, product "CavityRock".
 - b. Owens Corning, Wabash IN, product "Thermafiber, RainBarrier 45."
 - c. Johns Manville, Inc., Denver CO. product: "MinWool Curtainwall CW4".

2.7 FABRICATION

- A. General: Fabricate composite wall panels and accessories at factory identical to tested units using manufacturer's standard procedures and processes necessary to meet performance requirements.
1. Provide components of composite wall panel system that are products of one manufacturer, including composite panels, gaskets, head and sill trim, bottom weep, base extrusion, and metal copings.
- B. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- C. All panels shall be formed to specified dimension with tolerances to accommodate expansion and contraction between panels and structure members. Maintain indicated 3/4 inch deep reveal at all horizontal and vertical joints.
- D. Accessory and trim components shall be factory fabricated and ready for installation.
- E. Composite Panels: Fabricate composite wall panels with extruded aluminum stiffeners requiring no further fabrication or modification in field.
1. Horizontal Joints: Dry seal, drained and back ventilated.
 2. Vertical Joints: Pre-formed returns with metal spline and aluminum extrusion receptors and extruded drain channels.
 3. Reveals: 0.75 inch (18 mm).
 4. Formed Panel Thickness: As indicated on the Drawings.
- F. Fabricate panels in a manner that will eliminate condensation on the interior side. Design joints between panels to form weathertight seals.
1. Provide factory-assembled, wall panel units fabricate d to dimensions and joint configurations indicated on Drawings.

2. Form panel lines, breaks and angles sharp and true with surfaces that are free from warp or buckle.
3. Fabricate from sharply cut edges, with no displacement of aluminum sheet or protrusion of core.
4. Tolerances shall accommodate expansion and contraction between panels and structural members. Maintain the indicated reveal depth for both horizontal and vertical joints as indicated.

G. Panel Tolerances:

1. Flatness: Maximum allowable distortion: 1/32 inch in 24 inches (0.794 mm in 600mm) in any direction.
2. Thickness: $\pm 1/32$ inch.
3. Length and Width: +0, -1/8 inch.
4. Squareness: 1/64 inch per lineal foot.

2.8 FINISHES

A. MCM panels, trim, exposed flashing termination metal: Shop-applied Polyvinylidene Flouride (PVDF) resin based, high performance thermoplastic organic coating conforming to AAMA 2605, NAAMM - Metal Finishes Manual, and the following:

1. Resin base of 70 percent PVDF by weight, Arkema, Inc., product "Kynar 500" or Solvay Solexis, Inc. product "Hylar 5000".
2. Finish Coating shall be manufactured as one of the following products:
 - a. Akzo Nobel; product: "Trinar Ultra."
 - b. BASF International; product "Fluoroceram."
 - c. P.P.G. Industries Inc.; product "Duranar."
 - d. Valspar Corp., product: "Fluropon."
3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
4. Shop-prime all surfaces with a corrosion resistant, epoxy-based primer compatible with finish coating, averaging 0.2 to 0.4 mils dry film thickness, fully oven-cured.
5. Shop finish with one mica color coat, of polyvinylidene flouride enamel minimum 1.0 to 0.80 mil dry film thickness on all exposed surfaces, including all exposed screws, fastenings.
6. Total system dry film thickness: 1.2 mils.
7. Color and Appearance: Color shall be selected by Architect from paint manufacturer's available library of mica colors. Selected color shall match verified color sample submittal furnished to Architect.

2.9 ACCESSORIES

- A. MCM termination stiffeners, termination metal and metal air barrier transition:
1. Shop fabricated from aluminum sheets.
 2. Minimum thickness:

- a. MCM termination stiffeners and termination metal: 0.040 inch (1.016 mm).
- b. Metal air barrier transition: 0.031 inch (0.80 mm).
3. Fabrication:
 - a. Seal against weather.
 - b. Provide finished appearance.
 - c. Provide pull-out resistance and flatness.
 - d. Match surface aspect of adjacent metal wall panels.
4. Flashing Backside Coating:
 - a. Coating Thickness: 60 microns.
 - b. Abrasion Resistance, ASTM D 968, Method D: 140 liters.
5. Backer plates: Provide metal backing plates at panel edges, terminations, openings, splices, and where recommended by manufacturer, consisting of stainless steel sheet goods formed in configuration and thickness recommended by manufacturer.
6. Cleats: Continuous G90 galvanized cleats, formed in configuration, and thickness as recommended by the manufacturer, minimum 0.0239" (0.60mm).
- B. Fasteners: As recommended by manufacturer, concealed stainless steel.
- C. Fittings for Attaching Panels to Sub-Structure: Proprietary, custom made aluminum extrusions and clips in fabricator's standard profiles as required for complete installation; provide continuous extrusions full length around panel perimeter for panel reinforcement and alignment; intermittent clips not acceptable.
- D. Sub-frame/furring assembly: Steel, hot-dipped galvanized to G90 coating, designed to accommodate expansion and contraction, dynamic movements and design load requirements; provide plastic shims as thermal separator between extrusions and Sub-frame/furring assembly.
- E. Accessory angles: Hot dip galvanized, 20 gauge steel angles for trim fastening.
- F. Shims: Rigid plastic.
- G. Metal through-wall flashing: One (1) and two (2) piece metal through-wall flashing; 20 oz. zinc-coated copper through-wall flashing.
 1. Copper (99.5% pure), 20 ounce, 0.0216 inch thick, conforming to ASTM specification B370, coated both sides with zinc-tin alloy a minimum of 0.0005 inch thick per side; applied by hot-dip process. Composition of the alloy shall be approximately 50% zinc and 50% tin with trace elements controlled for durability, corrosion resistance and color. Satin finish.
 2. Solder shall conform to ASTM specification B32 and shall be pure in tin or lead-free, high tin. Surfaces to receive soldering should be chemically cleaned and/or mechanically cleaned to produce bright, clear alloy. To ease soldering, a tin-bearing flux may be applied to all surfaces to receive solder.
 3. Fabricate sheet metal fabrications in longest possible lengths. Turn back all exposed edges to form hems. Fabricate vertical faces with bottom edge formed outward and hemmed to provide a drip.

- H. Through wall flashing and air barrier termination membrane: Flexible self-sealing, self-healing, fully adhering composite flexible flashing, .8 mm (30 mils minimum.) of self-adhering butyl adhesive integrally bonded to a heavy foil facer. Membrane shall be interleaved with poly release paper until installed. Provide with manufacturer recommended surface conditioners, termination mastics, pre-formed corners and termination membrane edge sealant.
1. Product:
 - a. Carlisle Waterproofing, product: "Aluma-GRIP 701".
 - b. Berry Plastics Corporation product: "Polyken 626-35 Foilastic".
 - c. Tremco Commercial Sealants and Waterproofing, product: "ExoAir Foil Flashing".
 2. Minimum performance characteristics:
 - a. Carlisle Waterproofing product: Aluma-Grip 701 (basis of design).
 3. Termination membrane edge sealant.
- I. Sealant and backing materials:
1. For perimeter joints between system and abutting materials, excluding exterior metal-to-metal weather seals. Low modulus type, Multi-component non-sagging gun-grade polyurethane sealant, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type M, Class 25, Grade NS, use NT,M, A and O with a minimum movement capability of ± 50 percent, equal to the following: Mameco International, Inc., product "Vulkem 922".
 - a. Sonneborn Building Products Inc., Minneapolis MN; product, "Sonolastic NP2".
 - b. Tremco, Beachwood OH; product, "Dymeric 511".
 - c. Pecora Corporation, Harleysville PA; product "Dynatrol II".
 2. For metal to metal joints within system: One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, FS TT-S-001543A, Type, Class A with a minimum movement capability of +100 percent and -50 percent, equal to the following or as otherwise recommended by manufacturer:
 - a. Dow Corning Corporation, Midland MI; product, "790".
 - b. Tremco, Beachwood OH; product, "Spectrem 1".
 - c. General Electric Company (GE Silicones) Waterford NY; product, "Construction 1200".
 3. Sealant at insulated façade attachment system fastener penetrations and continuously along upper horizontal joint. One-component, high performance, non-priming, gun-grade, elastomeric polyurethane sealant equal to the following or otherwise recommended by manufacturer:
 - a. BASF, product: "MasterSeal NP 1".
 - b. Sika, product: "Sikaflex-15LM".
- J. Sealants and backing materials for the following conditions:
1. Horizontal and vertical joints as detailed and noted to receive sealant excluding exterior metal-to-metal weather seals.
 2. Concealed fastener heads.

3. Continuous sealant behind air barrier transition metal.
 4. Continuous sealant behind metal through wall flashing.
 5. Through wall flashing termination membrane edge sealant.
 6. Sealant: One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, FS TT-S-001543A, Type, Class A with a minimum movement capability of +100 percent and -50 percent, equal to the following or as otherwise recommended by manufacturer.
 - a. Dow Corning, product, "790".
 - b. Sika, product "Sika Sil-C 990".
 - c. Tremco, product "Spectrem 1".
- K. Thermally Insulated Façade Attachment System: Manufacturer's engineered shape fabricated from pultruded thermosetting, fire retardant, fiberglass reinforced isophthalic polyester resin size as shown on Drawings, thickness as required by manufacturers engineers calculations.
1. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, Manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Basis of Design: Advanced Architectural Products, Allegan, Michigan, product "SMARTci Systems, Inc –GreenGirt" engineered shape to meet structural requirements for application as detailed.
 - b. SFS Nvelope, product "NH2 System".
 - c. EcoCladding, Solana Beach, CA, product "Alpha HC110".
 - d. Armatherm Solutions, Deer Park, WA, product "Armatherm Horizontal "Z" Girts".
 - e. Manufacturers and systems not listed as basis of design and approved for use on the project must include all products, and accessories to equal or exceed basis of design as detailed.
 2. Apply sealant at thermally insulated façade attachment system fastener penetrations and continuously along upper horizontal joint.
- L. 40 mils min. EPDM membrane through-wall flashing at expansion joints in zinc-coated copper through-wall flashing equal to the following:
1. Wirebond, product, "EPDM Thru-wall Flashing or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine composite wall panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of composite wall panel system.
1. Inspect framing that will support composite wall panel system to determine if support components are installed as indicated on approved shop drawings and are within tolerances acceptable to composite wall panel system manufacturer.

- a. Maximum deviations acceptable to composite wall panel system manufacturer:
 - 1) 1/4-inch in 20 feet (6.4 mm in 6 m) vertically or horizontally from face plane of framing.
 - 2) 1/2-inch (12.7 mm) maximum deviation from flat substrate on any building elevation.
 - 3) 1/8-inch in 5 feet (3.2 mm in 1.5 m).
 2. Confirm presence of acceptable framing members to match installation requirements of composite wall panel system.
 - a. Confirm framing minimum .053 inch/16 ga (1.34 mm) at maximum 24 inch (610 mm) spacing.
 3. Verify that window, door, louver and other penetrations match layout on shop drawings.
- B. Construction Manager to correct out-of-tolerance work and other deficient conditions prior to proceeding with composite wall panel system installation.
- C. Evaluation and Assessment: At least two weeks prior to commencing the work of this Section, conduct a pre-installation inspection by a representative of the metal wall manufacturer at the Project site. Coordinate time of inspection to occur prior to installation of metal wall panels.
1. Any additional work resulting from pre-installation or completed installation inspections shall be provided at no additional cost to the Owner.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- B. Verify that substrate layout complies with shop drawing layout.
- C. Report any variations and potential problems to the architect.
- D. Do not start work until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. General: Comply with manufacturer's product data including product technical bulletins, product catalog installation instructions, and product carton instructions. Install composite wall panel system in accordance with approved shop drawings and manufacturer's recommendations.
- B. Furring and framing: Accurately align and attach furring and framing in strict compliance with framing manufacturer's recommendations and approved shop drawings.
 1. Frame wall openings with additional framing members at perimeter of openings as needed.

2. Align holes in framing members to facilitate electrical conduit and piping work.
 3. Provide all needed connections and accessories provide a complete structural system.
 4. Provide all needed members for proper fastening of aluminum track for panel system.
- C. Bracing: Provide bridging and bracing as recommended by manufacturer, as necessary, and as indicated on approved shop drawings. Provide kick-back bracing perpendicular to plane of framing system and securely anchored to building structure as needed to comply with specified performance requirements.
- D. Install aluminum track system as recommended by manufacturer. Installed track to receive panels shall be even, smooth, sound, clean, and free from defects detrimental to panel installation.
- E. Installation: Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
1. Horizontal joinery: Working from base of installation to top, connect upper panel to lower panel at dry seal joinery utilizing field-applied attachment clip.
 2. Vertical joinery: Provide reveal between vertical ends of panels as shown on shop drawings using hardware furnished by manufacturer.
 - a. Install splines where indicated.
 3. Galvanic action: Where elements of metal composite wall system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- F. Erect panels plumb, level, and true.
- G. Anchor panels securely in place accordance with manufacturer's approved shop drawings.
- H. Conform to panel manufacturer's instructions for installation of concealed fasteners.
- I. Rainscreen Installation: Dry seal horizontal joinery, Keep open spaces in horizontal joinery intended to ventilate cavity behind system.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written report. Correct deficiencies noted in report.

3.5 TOLERANCES

- A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- B. Erect the composite metal panel systems plumb and level, free of warp or twist.
1. Maximum misalignment of two adjoining members abutting in plane: 1/32 inch
 2. Maximum variation from plumb or level: 1/16 inch per 10 feet, non cumulative

3. Maximum offset from true dimensional alignment: 1/8 inch.

3.6 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Non-Conforming Work: Damaged and unapproved work shall be removed and replaced.
- C. Manufacturer Services: Field inspection of completed installation to be performed by a representative of the composite panel manufacturer and submit a written report.
 1. Installer shall correct deficiencies noted in report and additional deficiencies identified by Architect's observations.
 2. Replace damaged panels and accessories which cannot be repaired in field.

3.7 CLEANING

- A. General: Clean work under provisions of Section 01 70 00 – EXECUTION.
 1. Refer to AAMA 601.1 for cleaning and maintenance of panels.
- B. Remove temporary protective films within 2 weeks of erection. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.
- C. Replace damaged panels and accessories that cannot be repaired by field repair.
- D. After completion of the work of this Section:
 1. Remove equipment rubbish, and debris from the work area.
 2. Remove temporary protective films.
 3. Clean exposed panel surfaces promptly after completion of installation in accordance with recommendations of panel and coating manufacturer.
 4. Clear weep holes and drainage channels of obstructions, dirt, and sealant.
 5. Leave immediate site area in rake-clean condition.
 6. Protect and maintain wall system in clean condition during construction.

3.8 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

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Section 07 46 46
MINERAL FIBER CEMENT SIDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Design, engineer, furnish and install:
1. High-density fiber cement panelized siding system, factory primed and finished.
 2. Siding sub-frame/furring assembly.
 3. Thermally insulated façade attachment system.
 4. Sealant at thermally insulated façade attachment system fastener penetrations and continuously along horizontal joints.
 5. Continuous termination stiffener at termination metal and change of direction of thermally insulated façade system and locations to secure semi-rigid insulation.
 6. Continuous termination metal.
 7. Semi-rigid mineral wool insulation system behind fiber cement siding construction assembly or as otherwise noted, including semi-rigid mineral wool insulation, compatible adhesives for attachment to air/vapor barrier membrane, retention clips, flashing tape, edge sealant at joints and related accessories.
 8. Continuous bulk water resistive barrier.
 9. Continuous insect screen.
 10. One (1) and two (2) piece metal through wall flashing. Supply second piece to Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING for installation.
 11. Vertical furring behind roof base flashing wood blocking.
 12. Miscellaneous anchors, fasteners, sealants, and related accessories for panel attachment indicated.
 13. Continuous metal air barrier transition and flashing membrane.
 14. EPDM membrane at expansion joints.
 15. Structural Engineer-stamped prepared calculations and other performance criteria for each respective system.
 16. Mock-up panel components.
 17. Continuous “J” panel trim and aluminum angle/sealant/rivet assembly.

1.2 RELATED SECTIONS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work.
- H. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural wall framing.
- I. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, framing, curbs, nailers, and backer boards.
- J. Section 06 16 00 - SHEATHING: Wall sheathing behind composite wall panels.
- K. Section 07 21 00 – THERMAL INSULATION:
- L. Section 07 27 13 – MODIFIED BITUMINOUS SHEET AIR BARRIERS: Self-adhesive elastomeric sheet membrane air and vapor barrier system.
- M. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING: Membrane roofing and related insulation.
 - 1. Installation of through wall flashing component “piece 2” as furnished by this Section.
- N. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Counter flashings and cap flashing at roof.
- O. Section 07 71 00 - ROOF SPECIALTIES: Factory fabricated and finished roof edging.
- P. Section 07 92 00 - JOINT SEALANTS: Sealant, other than those specified herein.
- Q. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Entrance doors, frames, vestibule and storefront framing.
- R. Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS: Aluminum framed glazed curtain wall system.
- S. Section 08 51 13 - ALUMINUM WINDOWS.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 – REFERENCES.
 - 1. ASTM B136 - Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum.
 - 2. ASTM B244 - Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.
 - 3. ASTM C834 - Standard Specification for Latex Sealants.

4. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
5. ASTM C1186 - Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets.
6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM D1730 - Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting.
8. ASTM E96 - Test Methods for Water Vapor Transmission of Materials.
9. ASTM D1117 - Standard Guide for Evaluating Nonwoven Fabrics.
10. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
11. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
12. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.
13. AATCC127 - Water Resistance: Hydrostatic Pressure Test.
14. EN 12467 – Fiber-Cement Flat Panels – Product Specification and Test Methods.

1.4 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Product Data: Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods, including fastening patterns.
 2. Provide shop drawings and calculations and other performance criteria for loadings and stresses of support framing for each respective system under the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements have been satisfied.
 3. Shop Drawings: Provide shop drawings and erection plans for review including the following:
 - a. Layout of furring, finished sheets and fastener pattern.
 - b. Details at base and top of walls, corners, at window trim and at other openings and connections.
 4. Product certificates including Research//Evaluation report or Code Authority approval of the system use for intended application.
 5. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
 6. Verification Samples: For each finish product specified, two samples, minimum size 3 inches by 6 inches (76 mm by 150 mm) square, representing actual product, color, patterns and fasteners..

7. LEED Submittal Requirements:

- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
- b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

B. Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, the following

1. All certifications, reports and programs required by the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments for work engineered by Contractor's Profession Engineer under the requirements of this Section.

1.5 QUALITY ASSURANCE

- A. Discard lengths of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.
- B. Licensed Professionals: Professional Engineer, registered in the Commonwealth of Massachusetts.
- C. Manufacturer Qualifications: Company specializing in production of High-Density Fiber Cement Panels of the type specified with a minimum 10 years documented experience.
- D. Installer Qualifications: Company specializing in installation of High-Density Fiber Cement Panels of the type specified with a minimum 5 years documented experience and/or three project of equivalent size and scope.
- E. Source Limitations: Obtain panels and fasteners through one source from a single manufacturer.
- F. Pre-Installation Meetings: Conduct pre-installation meeting at the project site to comply with the requirements of Division 01. The following items shall be reviewed, but are not limited to:
 1. Project requirements.
 2. Substrate conditions.
 3. Manufacturer's installation instructions.
 4. Project specific wall assembly(s) and cladding attachment method(s).
 5. Temporary protection requirements during and after installation.

6. Required testing and inspection protocols.
 - G. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
 - H. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 1. Finish areas designated by Architect.
 2. Do not proceed with remaining work until workmanship, color and sheen are approved by Architect.
 3. Refinish mock-up area as required to product acceptable work.
- 1.6 DELIVERY, STORAGE AND HANDLING
- A. Do not deliver cement panels to site until job is ready for their installation.
 - B. Ship and handle all materials in a manner which will prevent damage; protect edges and corners from chipping.
 - C. Stack mineral fiber cement panels and trim on edge or lay flat on a smooth, level dry surface. Store sheets under cover and keep dry prior to installing.
 1. Store materials off the ground, flat and under cover in a dry place until erection.
 2. Keep materials dry and protect from freezing.
 3. Store materials in such a way to accommodate easy inspection of the materials prior to installation.
- 1.7 PROJECT CONDITIONS
- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- 1.8 WARRANTY
- A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 1. Provide manufacturer's 10 year transferable limited materials warranty, covering mineral fiber board panel siding and soffit panels, providing coverage for:
 - a. Damage in siding resulting from defects in material and fabrication.
 - b. Cracking, rotting, or delamination.
 - c. Damage from hail.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Performance Requirements:
 1. General: Provide fiber cement wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers'

standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

2. Structural Performance: Provide fiber-cement wall panel assemblies capable of withstanding the effects of gravity loads and loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592 and ASTM E 330 as applicable.
 - a. Wind Loads: As required by the 2015 International Building Code (IBC) with Massachusetts Building Code, Ninth Edition amendments (780 CMR).
 - b. Deflection Limits: Engineer fiber-cement wall panel assemblies to withstand test pressures with deflection no greater than 1/180 of the span and no evidence of material failure, structural distress, or permanent deformation exceeding 0.2 percent of the clear span, at code required loading.
3. Thermal Movements for Fiber-Cement Wall Panels: Provide fiber-cement wall panel assemblies that allow for noiseless thermal movements resulting from the following range in ambient temperatures and that prevent buckling, overstressing of components, failure of connections, and other detrimental effects:
 - a. Ambient Temperature Range: Minus 20 to plus 180 deg F.

2.2 COMPONENTS

- A. Specified Manufacturer and Product: To establish a standard of quality, design and function desired, Drawings and specifications have been based on SVK Belgium, product "Colormat Classic Basic" and "Colormat Classic Project", as distributed by Pace Representative, Braintree, MA.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein and approval with specified liquid air barrier (for compatibility), manufacturers offering similar products include the following, or approved equal:
 1. SVK Belgium, as distributed by Pace Representative, Braintree, MA.
 2. American Fiber Cement Corporation, Littleton, CO.
 3. Swiss Pearl Group, Niederurnen, Switzerland.

2.3 HIGH-DENSITY FIBER CEMENT PANELS

- A. Through body color and material high-density fiber cement panels complying with ASTM C 1186/EN 12467, Type A Grade IV and performance requirements indicated below:
 1. Format Panel Sizes: Maximum panel sizes available to suit field conditions by 5/16 inch (8mm) thick.
 - a. Panel sizes as indicated on Drawings.
 - b. Tolerances:
 - 1) Length: +/- 1/16" (2mm)
 - 2) Width: +/- 1/16" (2mm)
 - 3) Thickness Within a Sheet: <10%
 - 4) Thickness Sheet to Sheet: < +/-0.05"
 2. Modulus of Elasticity (Wet): $\geq 1,740,452$ psf
 3. Flexural Strength (Equilibrium): ≥ 3190 psi
 4. Panel Density: ≥ 100 lb/ft³

5. Manufacturing: Double Pressed
 6. Water Absorption: ≤20%
 7. Surface Burning Characteristics: ASTM E84 (*EN-13501*)
 - a. Flame Spread Index: 0 (*A2*)
 - b. Smoke Development Index: 5 or less (*s1*)
 8. Combustibility (ASTM E136): Non-combustible
 9. Color:
 - a. As selected by Architect from the manufacturer's standard color range or matching basis of design color range.
 - b. Number of colors as indicated on Drawings.
 10. Surface:
 - a. Classic (lightly sanded surface)
 11. Surface treatment:
 - a. Manufacturer's factory applied hydrophobic coating
 - b. Cut panels to receive manufacturer's approved field sealer/coating.
 12. Characteristics not acceptable: Efflorescence.
- B. Panel Attachment:
1. Exposed Fastening: Provide with manufacturer's corrosion-resistant stainless steel color-matched fasteners of type, size and spacing required for type of substrate and project conditions.
 2. Follow manufacturer's instructions for fastener spacing between fasteners and panel edges.
 3. Interior conditions: Refer to drawings for details. Provide manufacturer's color-matched fasteners.
- C. Flashings: Provide sheet metal flashings and trim as required for cladding system in accordance with Section 07 60 00 - FLASHING AND SHEET METAL.
1. Shop form components to profiles, dimensions, and thicknesses indicated on Drawings. Items to be provided include:
 - a. 20 ounce zinc-coated copper through wall flashing at bottom of air cavities, windowsills, doors and pressurized compartments to gravity drain water from cavity.
 - b. Formed profiles fabricated and installed to shed water within horizontal joint condition (non-continuous, interrupted at vertical U profile).
 - c. Aluminum flashing at parapet caps, transition pieces to adjacent materials and other exposed trim. Attach with clips or other means to avoid exposed fasteners.
 2. Form sheet metal fabrications in longest possible lengths. Turn back all exposed edges to form hem. Fabricate vertical faces with bottom edge formed outward and hemmed to provide drip.
- B. Metal through wall flashing: One (1) and two (2) piece metal through-wall flashing; 20 oz. zinc-coated copper through-wall flashing.
1. Copper (99.5% pure), 20 ounce, 0.0216 inch thick, conforming to ASTM specification B370, coated both sides with zinc-tin alloy a minimum of 0.0005 inch thick per side; applied by hot-dip process. Composition of the alloy shall be approximately 50% zinc and 50% tin with trace elements controlled for durability, corrosion resistance and color. Satin finish.
 2. Solder shall conform to ASTM specification B32 and shall be pure in tin or lead-free, high tin. Surfaces to receive soldering should be chemically cleaned and/or mechanically cleaned to produce bright, clear alloy. To ease soldering, a tin-bearing flux may be applied to all surfaces to receive solder.

3. Fabricate sheet metal fabrications in longest possible lengths. Turn back all exposed edges to form hems. Fabricate vertical faces with bottom edge formed outward and hemmed to provide a drip.

2.4 FINISHES

- A. Exposed flashing and termination metal (other than through-wall): Shop-applied polyvinylidene fluoride (PVDF) resin-based, high-performance thermoplastic organic coating conforming to AAMA 2605, NAAMM – Metal Finishes Manual, and the following:
 1. Resin base of 70 percent PVDF by weight, Arkema, Inc. product 'Kynar 500' or Solvay Solexis, Inc., product "Hylar 5000".
 2. Finish coating shall be manufactured as one of the following products:
 - a. Akzo Nobel; product: "Trinar Ultra."
 - b. BASF International; product "Fluoroceram."
 - c. P.P.G. Industries Inc.; product "Duranar."
 - d. Valspar Corp., product: "Fluropon."
 3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
 4. Shop-prime all surfaces with a corrosion resistant, epoxy-based primer compatible with finish coating, averaging 0.2 to 0.4 mils dry film thickness, fully oven-cured.
 5. Shop finish with one color coat, of polyvinylidene fluoride enamel minimum 1.0 to 0.80 mil dry film thickness on all exposed surfaces, including all exposed screws, fastenings.
 6. Total system dry film thickness: 1.2 mils.
 7. Color and Appearance: Color shall be selected by Architect from paint manufacturer's available library of non-exotic colors. Selected color shall match verified color sample submittal furnished to Architect.

2.5 ACCESSORIES

- A. Semi-rigid mineral wool insulation: Mineral wool fiber insulation board, conforming to ASTM C612, Type IVB having a nominal density of 4.4 pounds per cubic foot.
 1. Non-Combustible as tested per ASTM E-136.
 2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
 3. Thermal Resistance: ASTM C518 (C177), R-value of 17 minimum at 4 inches thick.
 4. Thickness: 4 inches.
 5. Acceptable products include the following or approved equal:
 - a. Roxul, Inc., Milton, Ontario, product "CavityRock".
 - b. Owens Corning, Wabash IN, product "Thermafiber, RainBarrier 45."
 - c. Johns Manville, Inc., Denver CO. product: "MinWool Curtainwall CW4".

- B. Termination stiffeners, termination metal and metal air barrier transition:
1. Shop fabricated from aluminum sheets.
 2. Minimum thickness:
 - a. At fiber cement siding termination stiffeners and termination metal: 0.040 inch (1.016 mm).
 - b. At metal air barrier transition: 0.031 inch (0.80mm).
 3. Fabrication:
 - a. Seal against weather.
 - b. Provide finished appearance.
 - c. Provide pull-out resistance and flatness.
 - d. Match surface aspect of adjacent metal wall panels.
 4. Flashing Backside Coating:
 - a. Coating Thickness: 60 microns.
 - b. Abrasion Resistance, ASTM D 968, Method D: 140 liters.
 5. Backer plates: Provide metal backing plates at panel edges, terminations, openings, splices, and where recommended by manufacturer, consisting of stainless steel sheet goods formed in configuration and thickness recommended by manufacturer.
 6. Cleats: Continuous G90 galvanized cleats, formed in configuration, and thickness as recommended by the manufacturer, minimum 0.0239" (0.60mm).
- C. Sealant at insulated façade attachment system fastener penetrations and continuously along upper horizontal joint. One-component, high performance, non-priming, gun-grade, elastomeric polyurethane sealant equal to the following or otherwise recommended by manufacturer:
1. BASF, product: "MasterSeal NP 1".
 2. Sika, product: "Sikaflex-15LM".
- D. Thermally Insulated Façade Attachment System: Manufacturer's engineered shape fabricated from pultruded thermosetting, fire retardant, fiberglass reinforced isophthalic polyester resin size as shown on Drawings, thickness as required by manufacturers engineers calculations.
1. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, Manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Basis of Design: Advanced Architectural Products, Allegan, Michigan, product "SMARTci Systems, Inc –GreenGirt" engineered shape to meet structural requirements for application as detailed.
 - b. SFS Nvelope, product "NH2 System".
 - c. EcoCladding, Solana Beach, CA, product "Alpha HC110".
 - d. Armatherm Solutions, Deer Park, WA, product "Armatherm Horizontal "Z" Girts".
 - e. Manufacturers and systems not listed as basis of design and approved for use on the project must include all products, and accessories to equal or exceed basis of design as detailed.

2. Apply sealant at thermally insulated façade attachment system fastener penetrations and continuously along upper horizontal joint.
- E. 40 mils min. EPDM membrane through-wall flashing at expansion joints in zinc-coated copper through-wall flashing equal to the following:
1. Wirebond, product, "EPDM Thru-wall Flashing or approved equal.
- F. Support system framing: Steel, "Z" or hat shaped furring hot-dipped galvanized to G90 coating, designed to accommodate expansion and contraction, dynamic movements and design load requirements; provide plastic shims as thermal separator between extrusions and subframe/furring assembly.
1. Subframe/furring assembly shall be roll-formed from 16 gage minimum.
 2. Subframe/furring assembly shall be located at each structural building support and not more than 4 feet on center between supports unless otherwise indicated on the Drawings.
 3. Subframe/furring assembly shall have black finish.
- G. Fasteners: Stainless steel fastener, equal to SFS Intec LTD, product No. TW-S-D12. Color as selected by the Architect.
- H. Continuous insect screen: Stainless steel, black finish, 18 x 14 mesh fabricated from T304 stainless steel, 0.011 inch thick by 36 inches wide.
- I. Continuous Bulk Water Resistive Barrier: Zero VOC fully self-adhered vapor permeable air barrier sheet membrane consisting of multiple layers of spun-bonded polypropylene tested in accordance with ICC-ES AC 38 criteria to meet IBC and IRC requirements for weather resistive barriers having the following properties
1. Breaking strength and Elongation to ASTM D5034: 119 lbf (529 N), machine direction; 96 lbf (427 N), cross-machine direction.
 2. Water Vapor Permeance tested to ASTM E96 Method B: minimum of 63 perms (3620 ng/Pa.s.m²)
 3. Water Vapor Permeance tested to ASTM E398: minimum of 63 perms (3620 ng/Pa.s.m²)
 4. Air Leakage: ≤ 0.00002 cfm/ft² @ 1.57 psf (≤ 0.0001 L/s m² @ 75 Pa) when tested in accordance with ASTM E2178 and < 0.002 cfm/ft² @ 1.57 psf (< 0.01 L/s m² @ 75 Pa) when tested in accordance with ASTM E2357. Meets Air Barrier Association of America (ABAA) requirements for "Adhesive Backed Commercial Building Wraps".
 5. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage
 6. Application Temperature: Ambient temperature must be above -40 °F (- 40 °C)
 7. Surface Burning Characteristics tested to ASTM E84: Class A, Flame-spread index of less than 0, Smoke-developed index of less than 75
 8. Color: Black UV stable, 180 days 100% exposure prior to coverage with an open joint cladding.
 9. Acceptable manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in to the Work include the following or equal:

- a. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on VaproShield LLC., Gig Harbor, WA., self-adhering sheet membrane permeable air barrier "RevealShield SA."
 - b. Carlisle Coatings and Waterproofing, Wylie Texas, product "CCW-705RS".
- J. Through wall flashing membrane and air barrier termination membrane: Flexible, self-sealing, self-healing, fully adhering composite flexible flashing, 0.8 mm (30 mils minimum) or self-adhering butyl adhesive integrally bonded to a heavy foil facer. Membrane shall be interleaved with poly release paper until installed. Provide with manufacturer-recommended surface conditioners, termination mastics and pre-formed corners.
1. Product:
 - a. Carlisle Waterproofing product "Aluma-GRIP 701".
 - b. Berry Plastics Corporation, product "Polyken 626-35 Foilastic".
 - c. Tremco Commercial Sealants and Waterproofing, product "ExoAir Foil Flashing".
 2. Minimum performance characteristics:
 - a. Carlisle Waterproofing, product "Aluma-GRIP 701" – basis of design.
 3. Termination membrane edge sealant:
 - a. Product: Sonneborn NP-1, Dymonic FC, S-M 7100 Permathane Pro-Installer by Schnee-Morehead Div, ITW or Xtra-Bond 7500 TX by Premiere Industrial Supply. Provide letter of compatibility from each manufacturer.
- K. "J" panel trim at horizontal fiber cement overhang conditions: Extruded aluminum 6063-T5. Color match to adjacent panel construction.
1. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Easy Trim Reveals, Calgary, CA, product, "EZ 9 – Horizontal Soffit J Panel Trim" or approved equal.
 - a. Length: 10 feet.
 - b. Angle assembly: Riveted, 3/4 inch by 1-1/2 inch continuous 0.062 inch thick aluminum.
- 2.6 FINISH
- A. Factory Finish: Provide manufacturer's factory through-body color panel in color selected by Architect from manufacturer's full available palette of colors.
1. Factory-applied hydrophobic coating.
 2. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by a third party.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of sheathing, backing and support framing for all siding work.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. General: Install fiber-cement wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor fiber-cement wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving fiber-cement wall panels.
 - 2. Fastening of fiber-cement wall panels shall allow free movement due to thermal and moisture expansion and contraction.
 - 3. Predrill panels for installation of fasteners.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment per manufacturers recommendations.
 - 5. Install flashing and trim as fiber-cement wall panel work proceeds.
 - 6. Locate subgirt splices to be concealed by fiber-cement panels. Subgirt splice locations shall be coordinated to ensure that fixing of individual fiber-cement panels does not span multiple subgirts.
- B. Back Ventilation: Fiber-cement panels shall be installed as a back-ventilated rainscreen meeting the following criteria:
 - 1. Provide a minimum uninterrupted rainscreen cavity depth of 3/4". Vertical and horizontal compartmentalization of the rainscreen cavity is recommend for facades greater than 70' in height.
 - 2. Provide a minimum equivalent free area of 4.5 in²/12" air inlet and outlet at the top and bottom of the wall assembly, at openings, and other building features that otherwise interrupt the rainscreen cavity.
 - 3. Subgirts directly behind fiber-cement panels shall be oriented vertically unless approved otherwise by the manufacturer.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by fiber-cement wall panel manufacturer.
- D. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete fiber-cement wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

- E. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- F. Installation Tolerances: Shim and align fiber-cement wall panel units within installed tolerance of 1/4 inch in 20 feet non-accumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- G. Panel joints: All joints shall be open 3/8 inch (5mm) wide unless otherwise noted on drawings. Joint spacing subject to Architect's mock-up wall approval.

3.4 TOLERANCES

- A. Maximum variation for siding from true position of 1/8 inch in 8 feet for plumb.

3.5 CLEANING

- A. Daily clean work areas by sweeping and disposing of scraps and sawdust.
- B. Remove and replace broken, chipped, stained or otherwise damaged panels.
- C. Immediately after installing, wipe down panels. Do not use wire brushes, metallic tools or abrasives for cleaning.
- D. Protect cladding from roof run-off, splashed water, mud, sealants, bitumen, and other contaminants from remaining construction activities.
- E. Without damaging completed work, provide protective boards at exposed external corners, which may be damaged by construction activities.

End of Section

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Section 07 54 19
POLYVINYL CHLORIDE (PVC) ROOFING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 07 00 02 - ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 02.

1.2 SUMMARY

- A. Furnish and install the following:
1. Mechanically anchored induction welded polyvinyl chloride (PVC) sheet roofing system, including insulation, PVC clad metal and walkway pads.
 2. Flat and tapered roof insulation, tapered drain sumps, at mechanical curbs and crickets as part of Work provided under this Section.
 - a. Acoustical insulation at flutes in metal decking Type-NA acoustic metal roof deck as indicated on the Structural drawings.
 3. Vapor barriers below roof assembly.
 4. 5/8 inch and 1/2 inch thick roof board.
 5. Flashing at all penetrations through the roofing system and at all materials that abut roofing system.
 - a. Coordinate all penetration details and boot locations with all Trade Contractors and subcontractors as part of the coordination documents and shop drawing processes specified in Section 01 31 00 – PROJECT MANAGEMENT AND COORDINATION and Section 01 33 00 - SUBMITTAL PROCEDURES respectively.
 6. Building expansion joints occurring in roofing system.
 7. 5/8 inch and 1/4 inch thick roof protection board.
 8. PVC membrane protection strips under solar panel supports.
 9. Transition membrane and sealant at voids/gaps in roof air vapor barrier, roof expansion joint locations (including roof expansion joint connection to wall expansion joint), roof edge angle splice voids/gaps and tie-ins from roof to wall air barriers.
 10. Mock-up elements for field panel.
 11. Roof separation curb flashing.
 12. Sealing of roof to wall air barrier at membrane lap.
 13. PVC sheet roofing system membrane at vertical parapet walls full height and sealed to roof to wall air barrier membrane lap.
- B. Build-into place as work progresses, the following products and materials furnished under the indicated Sections:

1. ½ inch thick CDX plywood at HVAC concrete curbs as provided under Section 06 10 00 – ROUGH CARPENTRY in lieu of ½ inch cover board.
 2. Custom fabricated expansion joints at roofing furnished under Section 07 71 00 – ROOF SPECIALTIES.
 3. 20 oz. zinc coated copper through wall flashing piece 2 (counterflashing) for installation over PVC flashing termination as furnished by Section 04 20 00 – UNIT MASONRY.
 4. 20 oz. zinc coated copper through wall flashing piece 2 (counterflashing) for installation over PVC flashing termination as furnished by Section 07 42 43 – COMPOSITE WALL PANELS.
- C. Provide walkway pads in places of traffic leading from roof access points (ladders, stairs, doorways) to, and around rooftop mechanical equipment and elsewhere as indicated on the Drawings. See Roof Drawings for minimum requirements
- D. Provide manufacturer's pre-construction, mock-up and final inspection as specified herein. These inspections are to be included in the base bid; additional inspections, or work incurred as a result of the final inspection shall be without additional cost to the Owner.
- E. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.
- 1.3 RELATED REQUIREMENTS
- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
 - B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
 - C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
 - D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
 - E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
 - F. Section 05 31 00 - STEEL DECK.

- G. Section 06 10 00 - ROUGH CARPENTRY: Fire retardant treated blocking, curbing, plywood at HVAC curb at concrete base and nailers.
- H. Section 07 00 02 – ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS: Filed sub-bid requirements for work of this Section.
- I. Section 07 71 00 - ROOF SPECIALTIES: Roof edge.
- J. Section 07 92 00 - JOINT SEALANTS: Sealant other than those specified in this Section 07 54 19.
- K. Section 09 91 00 – PAINTING: Painting of vents through roof.
- L. Division 22 00 00 – PLUMBING: Roof and overflow drains.
- M. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Prefabricated curbs for roof mounted mechanical equipment.
- N. Division 26 - ELECTRICAL: Roof mounted photovoltaic system, lightning protection.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. FM: Roof Assembly Classifications and Loss Prevention requirements I-28 and I-29S.
 - 2. FM 4470 - Corrosion Resistance Testing.
 - 3. All applicable federal, state and municipal codes, laws and regulations for fire-resistance roof ratings.
- B. The following reference materials are hereby made a part of this Section by reference thereto:
 - 1. NRCA - Roofing and Waterproofing Manual, Latest edition.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Manufacturer's written and notarized certification that roofing membrane furnished for project has been treated with specified "dirt-repellent" acrylic coating.
 - b. Material Safety Data Sheets for products submitted.
 - 2. Manufacturer's specimen warranties: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.

3. Review statement: Written statement, signed by the roofing applicator, stating that the Contract Drawings have been reviewed by an agent of the roofing system manufacturer; accompanied by a pre-installation written statement from the manufacturer that the selected roof system is proper, compatible, and adequate for the application shown.
 - a. Provide certification from roofing manufacturer that system meets all identified code requirements.
 - b. The roofing applicator will notify the Architect and Owner in writing of any conditions that are in conflict with the Contract Documents for the proper application of the selected roofing system or the warranty requirements.
4. Project roofing superintendent's resume and project experience list for similar installations.
5. Shop drawings:
 - a. Setting plans for insulation, showing types of insulation, thickness and direction of slopes.
 - b. Fully dimensioned plans of roof at the same scale as the Contract Drawings. Indicate on plans all areas of roofing. Plans shall show changes in level, key locations of details, all roof penetrations, roof slopes and direction of slope. Indicate on plans any areas of proposed staging and material storage on roof.
 - c. Large scale design details, minimum of 1-1/2 inch per foot scale, showing perimeter flashing conditions and penetrations. Details shall show dimensions of actual measurements taken at the project and reflect actual conditions; manufacturer's standard preprinted details will not be accepted as substitute for shop drawings. Confirm acceptance of proposed detailing with manufacturer prior to submission to the Architect for review. Confirmation shall be in the form of an acceptance letter from the manufacturer on their corporate letterhead and signed by the manufacturer's representative.
6. Verification samples:
 - a. Roof membrane.
 - b. Vapor barrier.
 - c. Metal flashing.
 - d. Other components of the roof system as requested by the Architect.
7. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Exterior-Applied Products (adhesives, sealants, coatings, roofing and waterproofing materials) to demonstrate VOC compliance in accordance with CARB 2007 SCM for Architectural Coatings and SCAQMD Rule 1168 – July 1, 2005.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
- 1. Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.
 - 2. Manufacturer's warranties: Include coverage of materials and installation.
- 1.6 QUALITY ASSURANCE
- A. The manufacturer's authorized technical representative shall provide the following:
- 1. An initial site visit on the day roofing work commences to insure that the project proceeds in accordance with the manufacturer's requirements.
 - 2. Periodic site visits a minimum of once a month minimum to inspect the progress of the work and inspection of mock-up panel to identify installation issues and confirm work is proceeding in accordance with the manufacturer's requirements. Provide a field inspection report to the Construction Manager, Owner's Project Manager and Architect within one week of each site visit.
 - 3. Roofing manufacturer shall inspect all roof locations where photovoltaic cell are indicated prior to and following installation of the same. Roofing manufacturer shall create a punchlist of work the Roofing and Flashing Trade Contractor shall complete before photovoltaic cell installations can begin and after the work is complete for acceptance by the roofing manufacturer and continuance of warranty coverage.
 - 4. A final inspection at the completion of the project to insure, that the project has been completed in accordance with the manufacturer's requirements. Upon approval and acceptance of the project, furnish to Owner, implemented manufacturer's warranty certification.
- B. Submit Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.
- C. All roofing shall be as described in this Section and shall be provided and approved by the roof system manufacturer. Any materials not manufactured or provided by manufacturer shall have written approval from the manufacturer stating the materials are acceptable and are compatible with the other materials and systems required.
- D. UL Listing: Provide UL list Class "A" roofing materials.
- E. The roof system manufacturer's Technical Specifications shall be considered a part of this specification and should be used as a reference for specific application
-

procedures and recommendations. Where a conflict does exist between the manufacturer's written specifications and those procedures specified in this Section, the more stringent requirements meeting the Manufacturer's minimum requirements for the provided warranty shall apply.

1. Roofing Trade Contractor shall provide at no additional cost to this contract, all additional labor and materials to conform to manufacturer's required installation procedures which are necessary to provide a total roofing system which is in full compliance with manufacturer's warranty requirements, including additional materials, installation procedures, manufacturer's inspections, sample testing and other requirements.

1.7 REGULATORY REQUIREMENTS

- A. Refer to applicable building codes for roofing system installation requirements and limitations. When a conflict exists, the more restrictive document will govern.

1.8 MOCK-UP

- A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.9 PRE-INSTALLATION CONFERENCES

- A. Prior to commencing the work of this Section, the General Contractor shall conduct a pre-installation conference at the Project site and coordinate the time of said meeting to occur prior to installation of work under the related sections named below.
 1. Required attendees: Owner, Architect, Contractor, Roofing Applicator's Project Superintendent, roof manufacturer's technical representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - a. Section 05 31 00 – STEEL DECK
 - b. Section 07 42 43 – COMPOSITE WALL PANELS.
 - c. Section 07 62 00 - SHEET METAL FLASHING AND TRIM.
 - d. Section 07 71 00 - ROOF SPECIALTIES.
 - e. Section 07 72 00 - ROOF ACCESSORIES.
 - f. Section 11 40 00 - FOODSERVICE EQUIPMENT.
 - g. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING.
 - h. Division 26 - ELECTRICAL.
 2. Agenda:
 - a. Scheduling of roofing operations.
 - b. Review of staging and material storage locations.
 - c. Coordination of work by other trades.
 - d. Installation procedures for mechanical equipment.
 - e. Protection of completed roofing.

- f. Establish weather and working temperature conditions to which Architect and Contractor must agree.
 - g. Emergency rain protection procedure.
 - h. Establish conditions for which a temporary roof will be provided by the Contractor.
 - i. Discuss process for manufacturer's inspection and acceptance of completed roofing and flashings.
 - j. Manufacturer's deck inspection to be performed.
- B. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers or packages with labels and package seals intact and legible.
- B. Store all materials in accordance with the manufacturer's recommendations. Store rolled goods on clean, raised platforms. Store other materials in dry areas, protected from water and direct sunlight.
- C. Do not expose stored curable roofing materials and accessories, including uncured flashing, adhesives, sealants and pourable sealer, to a constant temperature in excess of 80 degrees Fahrenheit.
- D. Provide continuous protection of stored materials against deterioration for duration of project.
- E. Store insulation on dunnage and completely cover with a water-resistant breathable material. Provide weights to prevent wind damage to insulation.
- F. Distribute any materials stored on roof levels for immediate use to prevent concentrated loads that would impose excessive strain on deck or structural members. Protect roof stored materials to prevent displacement by the wind and protect from exposure to inclement weather and sun.
- G. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Apply roofing in dry weather; do not install roofing in inclement weather or when precipitation is predicted with greater than 20 percent possibility.
- B. Do not apply roofing membrane to damp or frozen deck surface.
- C. Apply roofing in ambient temperature approved by roof system manufacturer.

1.12 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Notify manufacturer's representative 48 hours in advance for deck acceptance. Plan the lay-up of roofing membrane with respect to deck slope; avoid situations where excessive drainage could pass into completed roofing.
- C. The Roofing applicator shall maintain communication with roofing manufacturer's representative to inform of progress and to schedule period sample testing.

1.13 WARRANTY

- A. Deliver to the Owner upon completion of the work of this Section, a conditional warranty for the roofing system, agreeing to promptly repair the roofing as necessary to prevent penetration of water through it.
 - 1. Base bid warranty shall cover product quality, performance, and workmanship for a period of 20 years.
 - a. Warranty shall include total roofing system, and membrane flashings.
 - b. Warranty shall provide coverage for maximum peak gust wind speed of 100 miles per hour.
 - 2. Roofing insulation warranty to match the roofing warranty.
 - 3. Applicator shall supply Owner with a separate 2 year workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with Contract Documents, the Applicator shall repair that defect at no cost to Owner. Applicator's warranty obligation shall run directly to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the following:
 - 1. Mechanically anchored induction welded roofing: Sika Sarnafil, Inc., "EcoSmart Roof" system with "Sarnafil S327 Membrane" and "RhinoBond" attachment.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Sika-Sarnafil, Inc., Canton, MA.
 - 2. Carlisle Syntech, Carlisle, PA.
 - 3. Johns Manville, Denver, CO.

2.2 SYSTEM DESCRIPTION

- A. Mechanically anchored induction welded polyvinyl chloride (PVC) roofing system, including insulation and substrate, shall meet Underwriters Laboratories, Inc. Fire Hazard Classification "Class A" roof including canopies.
- B. Regulatory Requirements: Refer to applicable building codes for roofing system installation requirements and limitations. When a conflict exists, the more restrictive document will govern.
- C. Performance Requirements
 - 1. Wind Loading: Panels and installation shall be designed to conform to 2015 International Building Code (IBC) with Massachusetts Building Code, Ninth Edition amendments (780 CMR) for basic wind speed of 134 miles per hour (3 second gust).
 - a. Additional Wind Uplift Performance Requirements: Design and construct roofing to in accordance with requirements of FM 1-28 for Roof System Approval Rating of FM 1-90.
 - 2. Above-deck roof components shall be designed and installed in accordance with requirements of FM 1-29 for performance requirements specified above.

2.3 ROOFING MATERIALS

- A. Recycled content of roof membrane: Use maximum available percentage of recycled material. Roofing membrane products incorporated into the work shall contain not less than 10 percent recycled content.
- B. Induction welded membrane: Minimum 0.060 inch thick (1.2 mm), tan surface color, recyclable, thermoplastic membrane, polyester scrim reinforced, with lacquer coating conforming to ASTM D-4434 (latest edition), Type III, Grade 1.
 - 1. Sheet width: Nominally 10 feet wide sheets (full-width sheets).
 - 2. Roofing membrane shall have conform to the following minimal properties:

Property	ASTM Test Method	Resultant Value
Tear Resistance:	D-751	45 lbf.
Breaking Strength:	D-751	200 lbf./in.
Elongation:	D-751	15 percent, MDxCMD
Seam Strength:	D-751	75 percent of breaking strength.
Heat Aging, Breaking Strength	D-751	Retaining 90 percent of tensile strength for heat aged at 176 degrees F. for 7 days.
Solar Reflectance Index (SRI)		0.73 (initial), 0.65 (3-year aged).

- C. Flashing membrane: Minimum 0.060 inches thick (1.2 mm) color to match roofing membrane, plasticized PVC, fiberglass reinforced, ASTM D-4434, Type II, Grade 1. having a minimal tensil strength of 1600 psi when testing in compliance with ASTM D-638.

- D. Coated metal flashing: PVC laminated to 24 gauge steel, with a zinc coating supplied by the hot-dip process conforming to ASTM A525 or A526, A90 or G90 coating weight standard equal to Sika Sarnafil "Sanaclad" at roof to roof separation.
- E. Securement discs:
 - 1. Mechanically anchored: High strength, 3 inch round, 22 gauge corrosion resistant plate with a polymer coating used with various fasteners to attach insulation boards to the roof deck and as a substrate for induction welding the roofing membrane.
 - 2. Fasteners: No. 15 corrosion-resistant fastener used with securement discs, to attach insulation and/or roof boards to steel roof decks. Shank diameter of approximately 0.21 inch (5.3 mm) and the thread diameter is approximately 0.26 inch (6.6 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a No. 3 Phillips recess for positive engagement
- F. Cant strips, tapered edge strips and flashing accessories: Types recommended by manufacturer of polyvinyl chloride material, provided at locations indicated and at locations recommended by manufacturer, including adhesive tapes, flashing cements, and sealants.

2.4 ROOFING INSULATION

- A. General: Insulation shall be approved or supplied by the roof manufacturer, and shall be UL listed and FM approved.
 - 1. Roof insulation is included as a system component under the specified "Total System" warranty and therefore shall either be furnished by the roofing manufacturer or be otherwise in compliance with the requirements of the roof system warranty.
- B. Acceptable manufacturers: subject to approval of roofing manufacturer and the following specification requirements are:
 - 1. Sika-Sarnafil, Inc., Canton, MA.
 - 2. Atlas Roofing Corporation, Atlanta, GA.
 - 3. The Dow Chemical Co., Midland, MI.
 - 4. Hunter Panels, Portland ME.
- C. Polyisocyanurate foam insulation manufactured with HCFC 14 pound blowing agent and bonded to glass fiber reinforced facers on top and bottom surfaces during the manufacturing process. Insulation shall conform to property requirements of FS HH-I-1972/GEN and FS HH-I-1972/2
 - 1. Thickness as indicated on Drawings and as required to achieve a minimum R-value of 45.
 - 2. Density: 2.0 pounds per cubic foot (ASTM D-1622).
 - 3. Compressive strength: 20 psi (ASTM D1621).
 - 4. Moisture vapor transmission: Less than 1 perm (ASTM E-96).
 - 5. Water absorption: Less than 1 percent per volume (ASTM C209).
 - 6. Provide tapered insulation system as required to meet elevations and slopes shown on drawings or as required by membrane manufacturer, whichever is more stringent. Provide cants and crickets at drains as necessary. Typical

slope ¼ inch per foot and ½ inch per foot at crickets. Provide 4 foot by 4 foot tapered drain sumps at all drain locations.

- D. Insulation fastening plates, minimum 3 inches square.
- E. Roof board: 1/2 inch thick typical or 5/8 inch thick where indicated on Drawings complying with ASTM C 1177 and FM 4450, Class I, non structural glass mat faced (with non-asphaltic filled heat-cured coating on one face), noncombustable, water-resistant treated gypsum core panel.
 - 1. Recycled content of cover board: Use maximum available percentage of recycled material. Recovery board products incorporated into the work shall contain not less than 4 percent recycled content.
 - 2. Acceptable manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Georgia-Pacific Building Products, Atlanta, GA, product: "DensDeck Prime Roof Board".
- F. Roof protection board: 1/4 inch thick typical or 5/8 inch thick where indicated on Drawings complying with ASTM C 1177 and FM 4450, Class I, non structural glass mat faced, noncombustible, water-resistant treated gypsum core panel. Provide ½ inch thick board at all roof crickets.
 - 1. Acceptable manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. CertainTeed Corporation, Valley Forge PA, product: "GlasRoc Roof Board"
 - b. Georgia-Pacific Building Products, Atlanta, GA, product: "DensDeck Roof Board".
 - c. United States Gypsum Company, Chicago, IL, product: "Securock Glass-Mat Roof Board".
- G. Adhesive for fully adhering polyisocyanurate roofing insulation, roof board, roof protection board and plywood at concrete locations: Two component reaction cure low rise polyurethane foam adhesive containing no solvents or HCFC and low VOC complying with SCAQMD and OTC regulations acceptable to the roofing manufacturer based on the performance requirements specified herein.

2.5 VAPOR BARRIER

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
 - 1. Sika-Sarnafil, Inc., Canton, MA, product "Sarnavap Self-Adhered".
 - 2. Bakor Inc., Mississauga, Ontario, Canada, product: "Blueskin SA".
 - 3. Carlisle Coatings & Waterproofing Inc., Sapulpa, OK, product: "CCW-705".
 - 4. W.R. Grace & Co., Construction Products Division, Cambridge MA, product: "Perm-A-Barrier".
- B. Vapor barrier: Prefabricated composite sheet minimum 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.1 mm (4 mils) of cross-

laminated, high-density polyethylene film to provide a minimum 1 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

1. Minimum Performance Requirements:
 2. Water Vapor Transmission: ASTM E 96, Method B - 2.9 ng/m²sPa (0.05 perms) maximum
 3. Water Absorption: ASTM D 570 - Max. 0.1% by weight
 4. Puncture Resistance: ASTM E 154 - 178 N (40 lbs.)
 5. Tear Resistance:
 - a. Initiation: ASTM D 1004 - min. 58 N (7.0 lbs.) M.D.
 - b. Propagation: ASTM D 1938 - min. 40 N (4.0 lbs.) M.D.
 6. Lap Adhesion at -4 degrees C (25 degrees F): ASTM D 1876 - 1,000 N/m (68 lbs./in.) of width
 7. Low Temperature Flexibility: ASTM D 1970 - Unaffected to -43 degrees C (-45 degrees F)
 8. Tensile Strength: ASTM D 412, Die C Modified, Min. 2.7 MPa (400 psi)
 9. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D 412 - Die C - Min. 200%
- C. Surface conditioner, liquid membrane tape, crack filler, mastics, and accessories as recommended by the sheet membrane manufacturer and comply with the following:
- a. Description: Latex-based, water-dispersible liquid for substrate preparation.
 - 1) Flash Point: No flash to boiling point
 - 2) Solvent Type: Water
 - 3) VOC Content: Not to exceed 350 g/l
 - 4) Application Temperature: -4 degrees C (25 degrees F) and above
 - 5) Freeze/Thaw Stability: 5 cycles min.
 - 6) Freezing point (as packaged): -20 degrees C (-5 degrees F)
 2. Termination Mastic:
 - a. Description: Rubberized asphalt-based mastic with 200 g/l max. VOC Content.
 3. Primer:
 - a. Description: Rubber-based primer in solvent with 680 g/l max. VOC content.
 - 1) Product: Grace Bituthene P-3000 Primer.
 - 2) Product: Carlisle CCW-702 or CCW-714 as recommended by manufacturer.
 - 3) Product: Bakor Blueskin Primer, Aquaprime or Aquatek as recommended by manufacturer.
- D. Membrane Transition Flashing:
1. Preformed Silicone-Sealant Extrusion/Transition Strip System:
Manufacturer's standard pre-formed extruded pre-engineered pre-cured, lowmodulus silicone-rubber extrusion, sized to fit opening widths, with a

singlecomponent, neutral-curing, 40 durometer. Class 100/50 low-modulus) translucent silicone sealant for bonding extrusions to substrates.

- a. Basis of design: Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Proglaze ETA, Connections."
 - 1) Width: As required by field conditions
 - 2) Acceptable products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a) Tremco Commercial Sealants & Waterproofing, Beachwood, OH, product: "Proglaze ETA, Connections."
 - b) Dow Corning Corporation, Midland, MI, product: "123 Silicone Seal".
 - c) Elbex Corporation, Kent, OH, product "HS 222" (0.030 inch thick).
2. Sealants and primers as recommended by transition flashing manufacturer and compatible with adjacent materials. Provide letters of compatibility from each manufacturer as required.
3. All penetrations of the roof air vapor barrier and locations where the roof transition membrane is installed shall be made air tight.

2.6 ACCESSORIES

- A. Screws: Steel fastener with fluorocarbon coating, complying with FM 4470 corrosion resistance test. Minimum thread diameter 0.22 inches and minimum shank diameter of 0.172 inches, as recommended by roofing manufacturer. Nail type fasteners are not permitted. Size fasteners to penetrate steel roof decking a minimum of 1-1/4 inches.
- B. Termination bars: 1 inch wide, aluminum or galvanized steel bar or extruded aluminum, 1/8 inch thickness, pre-punches at 12 inches on center; bar shall have a G90 coating (steel).
- C. Wind uplift securement bars: 14 gage hot-galvanized dipped U shaped bar, 1 inch wide by 1/8 inch wall thickness, prepunched at 12 inches on center.
- D. Adhesive: Roofing manufacturers contact adhesive.
- E. Sealant: Gun grade, non-sagging, urethane sealant, conforming to federal Specification TT-S-230C, Type II Class A, and ASTM C920, in manufacturer's standard colors as selected by the Architect.
- F. Roof metal: As required by manufacturer's shop drawings.
- G. Walkway surfacing: Polyester reinforced polyvinyl chloride embossed membrane 0.096 inches thick where indicated on Drawings, furnished by roofing manufacturer.
- H. Expansion Joints: Manufacturer' foam rod tube type expansion joint, sized for conditions indicated on Drawings.

- I. Miscellaneous materials: Best grade or quality as furnished or approved by the roofing manufacturer for the specific application including but not limited to the following:
 - 1. Pourable sealer.
 - 2. Water cutoff mastic.
 - 3. Stainless steel hose clamps.
 - 4. Non-shrink grout at pourable sealer pockets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Verify edge nailers, curbs and penetrations are in place prior to roofing, so that the roof system can be installed as continuously as possible.
- C. Verify the roof deck, and related surfaces are clean, smooth, flat, free of depressions, waves, or projections, properly sloped to drains, and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Any condition requiring correction or completion shall be corrected or completed prior to the installation of the roofing system. Notify Contractor of unacceptable conditions.
- F. Do not proceed until defects are corrected.
- G. Beginning of installation means acceptance of substrate and site conditions.

3.2 PREPARATION

- A. Carefully broom clean substrate immediately prior to roofing application.
- B. Where surface joints at roof and wall substrates exceed 1/4-inch width, fill flush with surface with pourable sealer or insulating foam before proceeding with the installation.

3.3 EMERGENCY MATERIALS AND PROCEDURES

- A. Maintain continuous temporary protection prior to and during installation of new roofing system. Do not leave unfinished roof areas uncovered over-night or during inclement weather.
 - 1. Provide temporary protective sheeting over uncovered deck surfaces.
 - 2. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights or temporary fasteners.
 - 3. Do not permit traffic over unprotected or repaired deck surface.
- B. Maintain on site equipment and materials necessary to apply emergency temporary coverage in the event of sudden storms or inclement weather.

- C. Do not install more insulation than can be covered by roofing system in the same workday. Do not apply more roofing than can be properly fastened and sealed in the same workday. Ensure that water does not flow beneath any completed sections of the roofing system, provide temporary closures.
- D. Roofing subcontractor is fully responsible for all damage due to water penetration occurring during the Work of this Section.

3.4 INSTALLATION - GENERAL

- A. The entire work of this Section shall be performed in accordance with the best standards of practice relating to trades involved.
- B. Follow local, state and federal regulations, safety standards and codes. When a conflict exists, the more restrictive document shall govern.
- C. Follow insurance underwriter's requirements acceptable for use with specified products or systems.
- D. The roof system manufacturer's Technical Specifications shall be considered a part of this specification and should be used as a reference for specific application procedures and recommendations. Where a conflict does exist between the manufacturer's written specifications and those procedures specified in this Section, the more stringent requirements meeting the Manufacturer's requirements for the provided warranty shall apply.
- E. Review all special conditions, such as at projections, at connections to sheet metal gravel stops, flashings with the Roofing Manufacturer, submit the Roofing Manufacturer's recommendations and details to the Designer for approval.
- F. Special Cautions:
 - 1. Do not use oil-based or plastic roof cement.
 - 2. Do not subject polymeric materials to contact with petroleum, grease, oil, solvents, vegetable or mineral oil, nor animal fat. Prevent contact with hot pipes, and ducts.
 - 3. Cements and bonding adhesive contain petroleum distillates and are extremely volatile and flammable. Avoid breathing vapors and do not use near fire or flame.
 - 4. Ensure that welding and bonding surfaces are dry during installation.

3.5 INSTALLATION – INSULATION AND OVERLAYMENT BOARD

- A. Install only as much material as can be covered with roofing membrane and completed before the end of the day's work, or before the onset of inclement weather.
- B. Place the constant thickness insulation of first layer and the subsequent tapered insulation to the required slope pattern in accordance with manufacturer's instructions. Stagger all joints.
- C. Neatly fit insulation to all penetrations, projections, and nailers. Loosely butt edges and ends of insulation with gaps not greater than 1/4 inch.

- D. Mechanical securement: Secure insulation and overlayment board to substrate with mechanical anchors of type and spacing indicated by membrane manufacturer; but in no case provide less than one anchor per 4 square feet of surface area, or less anchorage than required by FM "Loss Prevention Data Sheet 1-28".
 - 1. Fasteners shall have a minimum penetration of 1 inch (25 mm) through structural deck.
 - 2. Perimeter and Corner Areas:
 - a. Perimeter and corner area fastening will be determined by building height and width and other conditions according to ASCE 7 guidelines, the roofing manufacturer and the Owner's insurance provider. To meet perimeter and corner uplift requirements, increase fastener density by decreasing spacing between fastener points in one or both directions. Total tributary area to each fastener is no more than 60 percent for perimeter and 40 percent for corners, based on field of roof fastening density.
 - E. Adhesive securement:
 - 1. Mix adhesive components as directed by manufacturer.
 - 2. Allow adhesive to be pumped at a 1:1 ratio through the mixing system and delivered onto the roof substrate in a semi-liquid state.
 - 3. Apply fluid mixture in a minimum of ½ inch to 1 inch wide wet beads spaced a maximum of 12 inches on center that spread to a width in excess of 2 inches wide while rising between ¾ inch and 1 inch thick.
 - a. Bead spacing requirements to ensure compliance with performance requirements shall be providing in writing by the roofing manufacturer as part of the roofing submittal.
 - 4. Lay roof insulation board, roof board, roof protection board and plywood in place and "walk-in" to assure complete adhesion.
 - a. Perimeter and corner area fastening will be determined by building height and width and other conditions according to ASCE 7 guidelines, the roofing manufacturer and the Owner's insurance provider. To meet perimeter and corner uplift requirements, increase fastener density by decreasing spacing between fastener points in one or both directions. Total tributary area to each fastener is no more than 60 percent for perimeter and 40 percent for corners, based on field of roof fastening density.
- 3.6 MECHANICALLY ANCHORED INDUCTION WELDED INSTALLATION - MEMBRANE
- A. General: Begin application at the highest point of the highest roof level and work to the lowest point. Proceed in a work sequence to minimize construction traffic on completed areas of roofing.
 - B. Install perimeter membrane sheet as recommended by the roofing manufacturer for local wind conditions and as required for FM I-90 rating. Additionally, conform to perimeter attachment requirements specified in FM Loss Prevention Sheet I-29S.
 - C. 12 inch on center at 1/2 sheets (36 inch width sheets) or 18 inches on center at seams on 60 inch width full sheets.

- D. Apply membrane and mechanical attachment devices in accordance with manufacturer's instructions.
- E. Roll out membrane, free from wrinkles or tears. Inspect sheet for defects as it is being rolled out. Place sheet into place. Align sheet with previous sheet to obtain a lap width of not less 4-1/2 inches.
- F. Make cutouts in membrane for protrusions such that when the skirts on the factory fabricated accessories, when welded to the deck membrane, will cover the cutouts. Fasten around cutouts with approved fasteners.
- G. Clean and dry welding joint areas of both membrane sheets. Weld membrane as recommended by manufacturer without wrinkles and voids. Apply pressure to the lap to ensure contact.
- H. Heat weld skirt of membrane accessories and flashing. Welded seams shall be 3 inches wide minimum using machined welding equipment, and 4 inches with hand welding equipment. Make a close and visual inspection for the full length of each field weld.
 - 1. Inspect all lap edges, repair all unsealed areas, voids and fishmouths.
- I. Induction weld membrane to securement discs at all locations as recommended by the manufacturer.
 - 1. Activate weld between membrane and plate using approved portable induction device. The induction coil must be positioned over the center of the securement disc, +/- 1 inch (25 mm). Portable induction device must elevate the temperature of the securement disc from ambient to 400 – 500 degree F (204 – 260 degree C). Cycle time will be affected by available power, use a heavy gauge power cord, at a minimum 12 gauge by 100 feet.
 - 2. When the induction welding cycle is complete, immediately place a magnetic weight on the welded assembly. This device must be left in place for at least 60 seconds.
- J. Provide additional membrane securement at expansion joints, curbs, skylights, and similar roof top penetrations, at interior wall and penthouse perimeters, and at any angle change which exceeds 2 inches in on horizontal foot.
 - 1. Install fastening plates, 3 inches to 6 inches from inside and outside corners where additional membrane securement is required and where recommended by roofing manufacturer. Space fastening plates not greater than 12 inches on center.
 - 2. Weld polyvinyl chloride flashing over installed fastening plates as recommended by roofing manufacturer, and in no case provide flashing of less than 6 inches in width and at ends of flashing, provide a minimum 2 inch space from edge of plate.
- K. Extend membrane up cant strips and a minimum of 8 inches onto vertical surfaces.
- L. Install termination bars with screw fasteners located 6 or 12 inches on center. Install roofing manufacturer's recommended sealant along top and bottom edges of termination bar.

- M. Walkway Protection: Install walkway membrane at locations shown and where required from roof access points to all roof-mounted equipment.
 - 1. Clean roofing membrane and attach heat weld walkway pads, to roof, on center with each other in manner as recommended by manufacturer.

3.7 FIELD QUALITY CONTROL

- A. Prior to installation of roofing membrane, obtain an independent testing agency approved by the Architect and test six fasteners for each separate roofing area pull out resistance. Report findings to Architect and the roofing manufacturer. Perform testing without additional cost to the Contract.
- B. Field inspection will be performed under the provisions of Section 01 45 00 - QUALITY CONTROL and as indicated elsewhere in this Section.
- C. Roofing Trade Contractor to correct all deficiencies in roof as determined by roof sample analysis and as prescribed by roof system manufacturer. Should additional samples be required, these cost will be borne by the roofing applicator.

3.8 CLEANING

- A. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.
- B. Repair or replace defaced, or disfigured finishes caused by the work of this Section.

3.9 PROTECTION

- A. Provide special protection or avoid traffic on completed work. Contractor is responsible to restore to original condition, or replace, work and roofing materials damaged by work of other trades.

End of Section

Section 07 61 20
FIELD-FORMED METAL ROOFING AND CLADDING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 07 00 02 - ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 02.

1.2 SUMMARY

- A. Furnish and install pre-coated aluminum architectural roofing system, including:
1. Standing seam roofing panels with raised clips for venting.
 2. Integral flashings and underlayment.
 3. Moisture shedding eave, valley and ridge protection.
 4. Integral fascias and friezes.
 5. Blocking.
 6. Vapor barrier.
 7. Nailable roof insulation.
 8. Ice and water membrane barrier, full coverage.
 9. 5/8 inch roof protection board.
 10. Snow retention system.
 11. Gutters and downspouts.
 12. Related flashings and running sheet metal work, for all non-specified locations in conjunction with the roofs.
 13. Sealants in conjunction with metal work furnished hereunder, and plastic wedges for cap flashings terminating in reglets.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED SECTIONS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4*, *LEED for Building Design and Construction*, *LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 05 31 00 - STEEL DECKING.
- G. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, and nailers.
- H. Section 07 00 02 – ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS: Trade contract requirements for work of this Section.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AA: Aluminum Construction Manual, Aluminum Sheet Metal Work in Building Construction.
 - 2. ASTM A 361 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.
 - 3. ASTM A 446 -Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
 - 4. ASTM A 525 - Specification for Sheet Steel, Zinc Coated (Galvanized).
 - 5. ASTM B 209 - Specification for Aluminum Alloy, Sheet and Plate.
 - 6. ASTM B 221 - Specification for Aluminum Extrusions.
 - 7. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.
 - 8. NRCA - Roofing Manual.
 - 9. SMACNA - Architectural Sheet Metal Manual, 6th Edition.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's data sheets for each metal type and accessories furnished hereunder, include material specifications, performance data, physical properties and finishes.

2. Certification: Provide certifications that materials and systems comply with the specified requirements for the use indicated.
 3. Shop drawings:
 - a. Fully dimensioned large scale design details showing material profiles, splices, flashing terminations and other jointing details, fastening methods and installation details. Indicate material type, sizes, and weights or gages. Indicate extent of adjacent work specified under other Sections of the Specifications.
 - b. Fully detail methods of relieving stresses due to thermal movement, including sealing of expansion seams.
 - c. All details bearing dimensions of actual measurements taken at the project.
 4. Selection Samples:
 - a. Finished metal sample chips, indicating Manufacturer's full range of finish colors available for selection by Architect.
 - b. Provide additional samples as requested by Architect to facilitate initial selection of colors and finishes.
 5. Verification Samples:
 - a. 12 by 12 inch samples illustrating metal finish color.
 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Exterior-Applied Products (adhesives, sealants, coatings, roofing and waterproofing materials) to demonstrate VOC compliance in accordance with CARB 2007 SCM for Architectural Coatings and SCAQMD Rule 1168 – July 1, 2005.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
1. Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.

2. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with AA, AISI, CDA, SMACNA, and NRCA standard details and requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store, and protect and handle products to site under provisions of Section 01 60 00 - PRODUCT REQUIREMENTS.
- B. Store preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.8 WARRANTY

- A. Weathertight warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 1. Warranty Period: 20 Years from date of Substantial Completion
- B. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace standing seam metal roof panels that show evidence of deterioration of factory-applied finish within specified warranty period.
 1. Exposed Panels Finish - deterioration includes the following:
 - a. Color fading more than 5 hunter units when tested according to ASTM D 2244
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214
 - c. Cracking, checking, peeling or failure of a paint to adhere to a bare metal.
 2. Warranty Period: 20 Years from the date of substantial completion
- C. Applicator shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Berridge Manufacturing Company, Houston, Texas, Product: "Tee-Lock Panels with Extruded Vinyl Weatherseal".

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Berridge Manufacturing Company, Houston, Texas.
2. Peterson Aluminum, Elk Grove Village IL.
3. Firestone Building Products Company, LLC, Indianapolis, IN.
4. Englert, Inc., Perth Amboy, NJ.
5. MBCI, Houston TX.

2.2 MATERIALS

A. Aluminum: ASTM B 209, 3003-H14/3105-H14, 0.032 inch thick (roofing) or 0.040 inch thick (gutters and downspouts) sheet aluminum; shop pre-coated with polyvinylidene fluoride enamel finish of color as selected by the Architect from the manufacturer's full range of standard and custom colors.

1. Texture: Smooth.
2. Clips: Manufacturer's standard stainless steel locking clip.
3. Weatherseal: Manufacturer's standard vinyl weather seal.
4. Rating: Class 90 when tested in accordance with UL 580, Construction number 268B.

2.3 NAILABLE COMPOSITE INSULATED PANELS

A. Non-Vented Nailable Composite Insulation: Provide polyisocyanurate foam core insulation panels with a nailable wood fiber composite board surface that is acceptable to the roofing manufacturer for its warranties.

1. Provide panels consisting of an polyisocyanurate foam core bonded to oriented strand board (OSB) top layer and a fiber reinforced facer sheet on the bottom layer complying with ASTM C1289, Class 1 type V panel.
 - a. Nailable face: APA rated Sheathing OSB, 7/16 inch thick having a minimum span rating of 24/16, touch-sanded OSB.
 - b. Core: closed cell polyisocyanurate foam having a nominal compressive strength of 20 PSI (38 kPa) and a density of 2.0 pounds per cubic foot (32 kg/m³).
 - c. Bottom face: black glass fiber-reinforced felt facing sheet.
 - d. Panel Size: 4 by 8 feet.
 - e. Total Panel thickness: As indicated on Drawings.
2. Acceptable products
 - a. Atlas Roofing Corporation, Meridan MS, product "ACFoam Nail Base Insulation".
 - b. Cornell Corporation, Cornell WI, product "ThermaCal".
 - c. Johns Manville Roofing Systems Group, Denver CO, product "Nailboard".
 - d. Hunter Panels, Portland ME, product "H-Shield-NB"
 - e. Rmax, Inc., Dallas TX, product "Standard Nailable Base".

2.4 ROOF PROTECTION BOARD

- A. Roof protection board: 5/8 inch thick complying with ASTM C 1177 and FM 4450, Class I, non structural glass mat faced, non-combustible, water-resistant treated gypsum core panel.
 - 1. Acceptable manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. CertainTeed Corporation, Valley Forge PA., product: "GlasRoc Roof Board"
 - b. Georgia-Pacific Building Products, Atlanta, GA, product: "DensDeck Prime Roof Board".
 - c. United States Gypsum Company, Chicago, IL, product: "Securock Glass-Mat Roof Board".

2.5 PROTECTION MEMBRANE

- A. High temperature membrane for ice-dam and wind-blown rain protection ("Ice and Water Barrier Membrane"): Sheet barrier of high density cross laminated polyethylene with butyl-based rubber adhesive, with strippable silicone-coated release sheet.
 - 1. Performance characteristics:
 - a. Thickness: Membrane 0.76 mm (30 mil) ASTM D3767 Method A.
 - b. Minimum tensile strength (tested in accordance with ASTM D 412, die C) 250 pounds per square inch [1720 kN/m²].
 - c. Minimum elongation to ultimate failure of 250 percent, and unaffected pliability when tested per ASTM D 412 Die C modified.
 - d. Low Temperature Flexibility Unaffected @ -29°C (-20°F) ASTM D 1970
 - e. Minimum adhesion of 3 pounds per inch width (528 N/m), tested per ASTM D 903 to plywood.
 - f. Maximum permeance when tested in accordance with ASTM D 96, 0.05 perms (2.9ng/m²sPa).
 - g. Material Weight Installed (Max) 1.1 kg/m² (0.22 lb/ft²) ASTM D461
 - 2. Subject to conformance with the above requirements, Acceptable products include the following, or approved equal:
 - a. W.R. Grace Company, Cambridge MA., product "Grace Ultra".
 - b. Firestone Building Products, Indianapolis, IN., product "Clad-Gard SA"
 - c. SDP Advanced Polymer Products Inc., Toronto Canada, product "Palisade SA-HT".

2.6 VAPOR BARRIER

- A. Reinforced vapor barrier: 3 ply laminated vapor barrier consisting of two layers of low density polyethylene and a high-strength non-woven diamond pattern grid core, having a minimum of 48 strands per square foot. Equal to Reef Industries Inc., Houston TX., product "Griffolyn 55FR vapor barrier". Product shall additionally comply with the following:
 - 1. Color: "Natural / White". Dark colors will not be acceptable.

2. NFPA 701 Large Scale - "Standard Methods of Fire Tests for Flame Resistant Textiles and Films".
3. Class A flame spread rating per ASTM E-84. (with tested results not greater than Flame Spread 5, Smoke developed 75).
4. Yarn grid shall have a PPT tear strength of at least 16.0 pounds (tested per ASTM D2582).

2.7 SNOW RETENTION SYSTEM:

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on S-5! Attachment Solutions, Metal Roof Innovations LTD, Colorado Springs, CO., Product: " S-5! ColorGard".
 1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Metal Roof Innovations LTD, Colorado Springs CO., Product: " S-5! ColorGard".
 - b. Alpine Snow Guards, Morrisville, VT, Product: "SnoMax"
 - c. Petersen Aluminum (PAC), Elk Grove Village, IL, Product "ColorGard Snow Retention System".
- B. Clamps: Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85, sized to fit roof seam, with supplemental clips to secure rails for roofing system seam spacing.
 1. Set screws: Stainless steel, 18-8 alloy, 3/8 inch diameter, with round nose point.
 2. Attachment bolts: Stainless steel, 18-8 alloy, 10 mm diameter, with flat washers.
- C. Rails: Extruded aluminum conforming to ASTM B221, alloy 6061-T6.
 1. Receptacle in face to receive color-matched metal strips.
 2. Provide splice connectors ensuring alignment and structural continuity at end joints.
- D. Finish: Match finish system specified for sheet metal roofing system.

2.8 ACCESSORIES

- A. Fasteners: Same material and finish as roofing and flashing metal, of sizes most appropriate for the specific application, and equipped with soft neoprene washers.
- B. Primer: Zinc chromate type as recommended for aluminum.
- C. Sealant in conjunction with metal work: One-part acrylic terpolymer sealant, Tremco Mono, Pecora Unicrylic, Sonneborn Sonac, or equal, in color to match the color of the metal.
- D. Plastic cement as recommended by roofing manufacturer.
- E. Bedding Compound: Rubber butyl type.

- F. Reglets: Recessed type, galvanized steel; face and ends covered with plastic tape.

2.9 ROOFING FABRICATION

- A. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance. To the greatest extent applicable, fabricate sheet metal components in shop, and thoroughly clean all joints on both sides of the sheet metal work.
- B. Fabricate cleats and starter strips of same material as sheet, minimum 6 inches wide, interlockable with sheet.
- C. Form roofing material with standing seams.
- D. Hem exposed edges on underside 1/2 inch, miter and seam corners.
- E. Form flashings as required, or to profiles indicated on the Drawings, to protect materials from physical damage and shed water.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.10 FINISHES

- A. Aluminum roofing, fascia, edging, exposed trim and any other aluminum indicated for enamel or color finish: Shop-applied polyvinylidene fluoride enamel finish system equal to PPG Industries, Product: "Kynar Mica Metallic", applied as follows, in the selected colors.
 - 1. Prime all surfaces with a corrosion resistant, epoxy-based primer compatible with finish coating, minimum 2.0 mils dry film thickness, fully oven-cured.
 - 2. Provide a finish coating of polyvinylidene fluoride enamel on all exposed surfaces, including all exposed screws, fastenings, etc., with a minimum coating of 1.0 to 1.3 mils. dry film thickness.
 - 3. Provide a clear top coating of polyvinylidene fluoride enamel on all exposed surfaces, including all exposed screws, fastenings, etc., with a minimum coating of 1.0 to 1.3 mils. dry film thickness.
 - 4. Ensure that all coatings, proposed to be applied hereunder, are compatible with the receiving substrate material for each condition, thoroughly clean, and treat aluminum by chromate process.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

2.11 EXTRA MATERIALS

- A. Provide sufficient quantity of each color finish coat material, for field touch-up work after erection, and pack the additional coating materials with the components to be furnished hereunder.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections.
- B. Verify deck is dry and free of snow or ice. Verify joints in wood deck are solidly supported and fastened.
- C. Verify correct placement of wood nailers.
- D. Verify reglets in place.
- E. Verify roofing termination and base flashings are in place, sealed, and secure.
- F. Beginning of work shall constitute acceptance of the conditions of the surfaces to which this work is to be applied.

3.2 PREPARATION

- A. Field measure site conditions prior to fabrication.
- B. Install starter and edge strips, and cleats before starting installation.
- C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- D. Insert flashings into reglets to form tight fit. Secure in place with lead wedges at a maximum of 8 inches on center. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.
- E. Seam and seal all joints. Apply plastic cement compound between metal flashings and felt flashings, asphalt shingle roofing or asphalt roll roofing.
- F. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- G. During the installation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 INSTALLATION OF PROTECTION MEMBRANE

- A. Preparation:
 - 1. New substrate: Remove all dust, dirt, loose nails and other protrusions from the deck/sheathing.
- B. General: Apply protection membrane in accordance with manufacturer's instructions, starting application at low point and working upwards. At ridges and valley, start a center and work outwards. Lap sides a minimum of 3-1/2 inches (90 mm) and lap ends 6 inches (150 mm).
 - 1. Provide protection membrane over 100 percent of the roofing surface.

3.4 INSTALLATION - ROOFING

- A. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.
 - 1. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
 - 2. Install starter and edge trim before installing roof panels.
 - 3. Remove protective strippable film prior to installation of roof panels.
 - 4. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
- B. Install accessory components required for a complete roof panel system including, trim, copings, fascia, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealant, gaskets, fillers, closure strips, and similar items.
- C. Installation tolerances: Shim and align panel units within tolerance of 3/8 inch in 40 feet on level/plumb/slope and location line as indicated and within 1/8 inch offset to adjoining faces and of alignment of matching.
- D. Install sealant for preformed roofing panels as approved on shop drawings.
- E. Do not allow panels or trim to come into contact with dissimilar materials.
- F. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
- G. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
- H. Remove and replace any panels or components which are damaged beyond successful repair.

3.5 INSTALLATION - FLASHINGS

- A. Clean and seam all joints. Apply plastic cement compound between metal flashings and felt flashings, asphalt shingle roofing or asphalt roll roofing.
- B. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- C. Seal joints watertight.

3.6 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

3.7 PROTECTION

- A. Protect finished work; do not permit traffic over unprotected roof surfaces.

End of Section

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Section 07 62 00
SHEET METAL FLASHING AND TRIM
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 07 00 02 - ROOFING AND FLASHING FILED TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 02.

1.2 SUMMARY

- A. Furnish and install the following:
1. Aluminum flashings and running sheet metal work.
 2. Cap flashings in conjunction with roofing system membrane base flashings.
 3. Formed aluminum brake-metal work at exterior overhead door head and jambs.
 4. Sealant in conjunction with sheet metal work specified herein.
- B. Furnish the following items for installation under related sections:
1. Two-piece aluminum counter flashing (piece #2) sleeper and canopy cap flashings furnished for installation under Section 07 54 19 – POLYVINYL-CHLORIDE (PVC) ROOFING.
 2. 20 gauge galvanized sheet metal miscellaneous flashings for installation under Section 07 54 19 – POLYVINYL-CHLORIDE (PVC) ROOFING.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 04 20 00 - UNIT MASONRY: Flashing at masonry, installation of reglets furnished by this Section.
- H. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, nailers.
- I. Section 07 00 02 – ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- J. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING: Sheet membrane flashings for flanges of curbs, and sheet membrane roofing and flashing system.
- K. Section 07 71 00 - ROOF SPECIALTIES: Factory fabricated and finished roof edging.
- L. Section 07 72 00 – ROOF ACCESSORIES
- M. Section 07 92 00 - JOINT SEALANTS: Sealant and backing material not specified herein
- N. Flashing sleeves and collars for mechanical and electrical items protruding through roofing: By respective trade sections furnishing same.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM A 666 -
 - 2. ASTM B 209 - Specification for Aluminum Alloy, Sheet and Plate.
 - 3. ASTM B 221 - Specification for Aluminum Extrusions.
 - 4. ASTM D 226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - 5. ASTM D 2178 - Asphalt Impregnated Glass Mat for Roofing and Waterproofing.
 - 6. ASTM D 4586 - Asphalt Roof Cement, Asbestos-Free.
 - 7. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.
- B. The following reference materials are hereby made a part of this Section by reference thereto:

1. SMACNA - Architectural Sheet Metal Manual 6th Edition, referred to herein as "Sheet Metal Manual".
2. NRCA - Roofing and Waterproofing Manual.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's data sheets for each metal type and accessories furnished hereunder, include material specifications, performance data, physical properties and finishes.
 2. Certification: Provide certifications that materials and systems comply with the specified requirements for the use indicated.
 3. Shop drawings:
 - a. Fully dimensioned large scale design details showing material profiles, splices, flashing terminations and other jointing details, fastening methods and installation details. Indicate material type, sizes, and weights or gages. Indicate extent of adjacent work specified under other Sections of the Specifications.
 - b. Fully detail methods of relieving stresses due to thermal movement, including sealing of expansion seams.
 - c. All details bearing dimensions of actual measurements taken at the project.
 4. Selection Samples:
 - a. Color samples: Architect to select custom color including colors designated by the coating manufacturer as premium or metallic colors. Up to two colors may be selected. Architect to provide color samples.
 - b. Provide physical samples as requested by Architect for initial selection of colors and finishes.
 - c. Manufacturer's sample board for sealant colors, for selections by the Architect.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.
- 1.6 QUALITY ASSURANCE
 - A. Company specializing in fabrication and installation of sheet metal flashing work with minimum 5 years documented experience.
- 1.7 MOCK-UP
 - A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.
- 1.8 PRE-INSTALLATION CONFERENCES
 - A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.
- 1.9 DELIVERY, STORAGE AND HANDLING
 - A. Store preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
 - B. Prevent contact with materials during storage which may cause discoloration, staining, or damage.
- 1.10 SEQUENCING AND SCHEDULING
 - A. Coordinate the installation of flashings and sheet metal work with the various trades responsible for installing interfacing materials, and install the work at appropriate times so as not to delay the progress of related work.

PART 2 - PRODUCTS

- 2.1 MATERIALS
 - A. Aluminum flashing: FS QQ-A-250d sheet aluminum, PVDF finish, having a minimum thickness as specified herein below, for applications where indicated:
 - 1. Exposed to weather flashings, gutters, downspouts, straps, and trim: 0.050 inch thick
 - 2. Aluminum Finish:
 - a. Polyvinylidene Fluoride (PVDF), Kynar 500 shop applied three coat resin based, high performance thermoplastic organic coating in custom non-standard color to match Architect's sample, conforming to AAMA 605.2, NAAMM - Metal Finishes Manual, and the following.
 - 1) Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
 - 2) Finish Coating shall be manufactured as one of the following products:
 - a) Glidden Company; product "Visulure".

- b) Morton International; product "Fluoroceram CL".
- c) PPG Industries Inc.; product "Duranar XL".
- d) Valspar Corp., product: "Flurothane".
- b. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
- c. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
- d. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.
- e. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness.
- 3. Color and Appearance: Provide colors to match Architect provided sample from manufacturer's complete range of options, without additional cost to the Owner. Color required may be considered "premium" or "metallic" by the coating manufacturer.
 - a. Gloss: Medium, measured by ASTM D523, 35±5 at 60 degrees Fahrenheit.
- 4. The manufacturer of the products specified herein, under this Section, shall furnish to the Architect, color control samples of the color and finish selected on aluminum for issuance to other trades and manufacturers required to match these colors and finishes.
- B. Miscellaneous galvanized sheet metal flashing: Hot dip galvanized, 20 gauge steel.

2.2 ACCESSORIES

- A. Flashing cement: Trowel grade, composed of selected asphalt, solvents, and non-asbestos fillers, conforming to FS SS-C-153 Type 1, ASTM D 2822, Type 1 and ASTM D 4586, Type 1 (Non-asbestos) as manufactured by Karnak Chemical Corporation, product N°. 19 "Flashing Cement", or equal as manufactured by Koch Materials Company, J & P Petroleum Products Company or other approved manufacturer. Flashing cement must be compatible with all materials it comes in contact with.
- B. Dampproofing mastic: Trowel grade, self-priming type composed of selected asphalt, solvents, fibers and non-asbestos fillers, conforming to ASTM D 2822, Type 1 and ASTM D 4586, Type 1 (Non-asbestos) as manufactured by Karnak Chemical Corporation, product N°. 86 "Fibrated Trowel Mastic", or equal as manufactured by Koch Materials Company, J & P Petroleum Products Company or other approved manufacturer. Mastic shall be compatible with all materials that it comes in contact with.
- C. Nails shall not be smaller than N°.2 of 12 stub gauge (1.109 inches), with large flat heads, and of sufficient length to penetrate the wood nailers a minimum of 7/8-inch. Nails shall be stainless steel.
- D. Screws: Stainless steel wood screws, of sizes most appropriate for the specific application, and equipped with soft neoprene washers.

- E. Joint Sealer: Low modulus single component gun-grade polyurethane sealant, non-sagging, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type S, Class 12-1/2, Grade NS, use NT,M, A and O with a minimum movement capability of ± 25 percent, equal to the following:
 - 1. Mameco International, Inc., product "Vulkem 116".
 - 2. Sika Corp., Lyndhurst NJ; product, "Sikaflex".
 - 3. Sonneborn Building Products Inc., Minneapolis MN, product, "Sonolastic NP1".
 - 4. Tremco, Beachwood OH, product, "Dymonic".
 - 5. Pecora Corporation, Harleysville PA, product "Dynatrol I".
- F. Plastic cement as recommended by roofing manufacturer and eave protection manufacturer.

2.3 FLASHING FABRICATION - GENERAL

- A. Form flashings as required, or to profiles indicated on the Drawings, to protect materials from physical damage and shed water.
- B. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance. To the greatest extent applicable, fabricate sheet metal components in shop, and thoroughly clean all joints on both sides of the sheet metal work.
- C. Fabricate cleats and starter strips of same material as sheet.
- D. Form pieces in longest practical lengths, with flat lock seams. Hem exposed edges on underside 1/4 inch, miter and seam corners.
- E. Fabricate corners from one piece with minimum 18 inch long legs, solder for rigidity, seal with sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.
- B. Beginning of work shall constitute acceptance of the conditions of the surfaces to which this work is to be applied.

3.2 PREPARATION

- A. Field measure site conditions prior to fabrication.
- B. Install starter and edge strips, and cleats before starting installation.
- C. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- D. Cleat and seam all joints. Apply sealant between metal flashings.

- E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Seal all aluminum joints watertight.
- G. During the installation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 FLASHING INSTALLATION - GENERAL

- A. Except as otherwise shown on the reviewed shop drawings or specified herein, the workmanship of sheet metal work, method for forming joints anchoring, cleating, provisions for thermal movement, etc., shall conform to the standard details and recommendations of the sheet metal producer and those of producer organizations and research institutions and associations concerning the sheet metal used, in addition to the standards and details set forth in the referenced materials specified this Section.
- B. Face nailing will not be permitted, concealed cleating or other concealed method must be used to attach sheet metal work to structure.
- C. Ensure that fastenings do not exceed 8 inches on centers. Use flat head fasteners throughout, and seal all fastener heads after installation thereof.
- D. Fill all slip joints and overlapping surfaces in the assembly with specified sealant material, removing all excess sealant material from the prefinished surfaces immediately, to prevent staining the finish.

3.4 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

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Section 07 71 00
ROOF SPECIALTIES
TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 07 00 02 - ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 02.

1.2 SUMMARY

- A. The work of this Section consists of pre-fabricated and pre-finished metal roof specialties where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
 - 1. Factory fabricated and finished roof edging with drip edges.
 - 2. Sealant in conjunction with sheet metal work specified herein.
- C. Furnish the following items for installation under related sections:
 - 1. Custom fabricated expansion joints at roofing for installation under Section 07 54 19 - POLYVINYL CHLORIDE (PVC) ROOFING.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.

- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 04 20 00 - UNIT MASONRY: Installation of flashing at masonry infill.
- H. Section 07 00 02 – ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- I. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING: Sheet membrane flashings for flanges of curbs, and sheet membrane roofing and flashing system.
- J. Section 07 62 00 - SHEET METAL FLASHING AND TRIM:
 - 1. Shop and field formed flashing.
- K. Section 07 92 00 - JOINT SEALANTS: Sealant and backing material not specified herein.
- L. Flashing sleeves and collars for mechanical and electrical items protruding through roofing: By respective trade sections furnishing same.

1.4 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM A 361 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.
 - 2. ASTM A 446 -Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
 - 3. ASTM A 525 - Specification for Sheet Steel, Zinc Coated (Galvanized).
 - 4. ASTM B 209 - Specification for Aluminum Alloy, Sheet and Plate.
 - 5. ASTM B 221 - Specification for Aluminum Extrusions.
 - 6. ASTM D 226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - 7. ASTM D 1784 - Polyvinyl chloride material for outdoor exposure.
 - 8. ASTM D 2178 - Asphalt Impregnated Glass Mat for Roofing and Waterproofing.
 - 9. ASTM D 4586 - Asphalt Roof Cement, Asbestos-Free.
 - 10. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.
- B. The following reference materials are hereby made a part of this Section by reference thereto:

1. SMACNA - Architectural Sheet Metal Manual, referred to herein as "Sheet Metal Manual".
2. NRCA - Roofing and Waterproofing Manual.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Field Measurements
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.6 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's data sheets for each metal type and accessories furnished hereunder, include material specifications, performance data, physical properties and finishes.
2. Certification: Provide certifications that materials and systems comply with the specified requirements for the use indicated.
3. Shop drawings:
 - a. Fully dimensioned large scale design details showing material profiles, splices, flashing terminations and other jointing details, fastening methods and installation details. Indicate material type, sizes, and weights or gages. Indicate extent of adjacent work specified under other Sections of the Specifications.
 - b. Fully detail methods of relieving stresses due to thermal movement, including sealing of expansion seams.
 - c. All details bearing dimensions of actual measurements taken at the project.
4. Selection Samples:
 - a. Metal sample chips.
 - b. Manufacturer's sample boards for sealant colors.
5. Verification Samples:
 - a. 12 inch long samples of formed fascia, and downspouts.
6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.

- b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Exterior-Applied Products (adhesives, sealants, coatings, roofing and waterproofing materials) to demonstrate VOC compliance in accordance with CARB 2007 SCM for Architectural Coatings and SCAQMD Rule 1168 – July 1, 2005.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- 1. Bonds and Warranty Documentation: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.
- C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
- 1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner minimum 1 pint extra air-dry paint materials for future touch-up repairs and maintenance.

1.7 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Company specializing in fabrication and installation of sheet metal flashing work with minimum 5 years documented experience.
- C. Qualifications:
 - 1. Flashing and sheet metal applicator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
- D. Factory fabricated roof edge shall be certified by roof edge manufacturer to meet the following design criteria:
 - 1. SPRI Test Method RE-1 Test for Roof Edge Termination of Single-ply Roofing Membranes: The fascia system shall be tested to secure the membrane to minimum 100 lbs/ft in accord with SPRI Test Method RE-1. Use current edition of 'Wind Resistance Guide for Edge Systems Used with Low Slope Roofing Systems'.

2. SPRI Test Method RE-2 Pull-Off Test for Fascia: The fascia system shall be tested in accord with SPRI Test Method RE-2. Use current edition of 'Wind Resistance Guide for Edge Systems Used with Low Slope Roofing Systems'.
 3. FMRC Loss Prevention Data Sheet 1-49 "Perimeter Flashing". The fascia product shall be listed in current Factory Mutual Research Corporation "Approval Guide for Zone 1 - 60 PSF uplift.
- E. Sole Source for Finishes: Metal finish materials required for the Work of this Section shall be from the same manufacturer, as those specified in Section 07 42 43 – COMPOSITE WALL PANELS.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 2. Deliver materials in original packages or bundles bearing brand name, identification of manufacturer or supplier, and finish information.
- B. Storage and Handling Requirements:
1. Store preformed and prefinished material to prevent twisting, bending or abrasion and to provide ventilation. Slope metal sheets to ensure drainage.
 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 3. Prevent contact with materials during storage which may cause discoloration, staining or damage.
- 1.9 SEQUENCING AND SCHEDULING.
- A. Coordinate the installation of roof edge, copings, and sheet metal work with the various trades responsible for installing interfacing materials, and install the work at appropriate times so as not to delay the progress of related work.
- 1.10 WARRANTY
- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty:
1. Furnish 15 year warranty for fascia edging. Warranty shall include the replacement of gravel stop due to blow-off, leakage or membrane failure due to any form of weather with wind conditions up to 110 miles per hour.
 2. Furnish manufacturer's 20 year coating warranty for custom colors, covering film integrity, chalk resistance and color change, assigned to project. Warranty shall be pro-rated after 10 years.

1.11 EXTRA MATERIALS

- A. Provide sufficient quantity of each color finish coat material, for field touch-up work after erection, and pack the additional coating materials with the components to be furnished hereunder.
- B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturers and products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work are limited to the following:
 - 1. Sika Sanarfil Corporation, Canton MA, Product: "Edge-Tite Fascia".
 - 2. Metal ERA, Waukesha WI, Product: "Anchor-Tite AF".
 - 3. Firestone Building Products, Wausheka, WI, Product: "AnchorGard SP Fascia".

2.2 FACTORY FABRICATED FASCIA TRIM/ROOF EDGE

- A. Manufacturers and products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work are limited to the following:
 - 1. Sika Sanarfil Corporation, Canton MA, product "Edge-Tite Fascia".
 - 2. Firestone Building Products, Wausheka, WI, Product "AnchorGard SP/Fascia.
 - 3. Metal ERA, Waukesha WI, Product: "Anchor-Tite AF".
- B. Fascia trim/ roof edge: Multi-component aluminum system, Factory Mutual Inc. certified Class I-90, and shall conform to the following additional requirements:
 - 1. Performance characteristics:
 - a. Fascia shall freely thermal cycle on extruded bar substrate.
 - 2. Fascia trim, nominal 8.5 inch height, formed aluminum alloy 6063, temper T5 0.050 inch thick, 12 feet 0 inches lengths.
 - 3. Fascia corners: Factory fabricated, welded fascia, shop finished to exactly match running fascia. Minimum leg length 12 inches.
 - 4. Extruded bar: Shall be continuous 6063-T6 alloy aluminum at 12 feet 0 inches standard lengths with pre-punched slotted holes.
 - 5. Fascia trim/scupper assembly: Downspout scupper flat extended fascia type fabricated from 0.050 inch thick aluminum as fabricated by the manufacturer and finished to match the roof edge.
- C. Fasteners: As recommended by fascia manufacturer for particular substrate encountered. No exposed fasteners permitted.
- D. Finish, exposed aluminum:
 - 1. Polyvinylidene Fluoride (PVDF), Kynar 500 shop applied three coat resin based, high performance thermoplastic organic coating in custom non-standard metallic finish color to match Architect's sample, conforming to AAMA 605.2, NAAMM - Metal Finishes Manual, and the following:

- a. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
 - b. Finish Coating shall be manufactured as one of the following products:
 - 1) Glidden Company; product "Visulure".
 - 2) Morton International; product "Fluoroceram CL".
 - 3) P.P.G. Industries Inc.; product "Duranar XL".
 - 4) Valspar Corp., product: "Flurothane".
 - c. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
 - d. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
 - e. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
 - f. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.
 - g. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness.
2. Color and Appearance: Provide custom colors as provided by Architect including colors designated by the coating manufacturer as "bright," "premium," "pearlescent," or "metallic". Colors shall be in configuration approved by the Architect.
- a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.

2.3 ACCESSORIES

- A. Sealant in conjunction with metal work: Custom colored sealant, multi-component non-sagging gun-grade polyurethane sealant, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type M, Class 25, Grade NS, use NT,M, A and O with a minimum movement capability of ± 50 percent, equal to the following:
1. Tremco, product "Dymeric 240 / Dymeric 240FC".
 2. Sonneborn, product "Sonolastic NP2".
 3. Pecora, product "Dynatrol II".
 4. Sika, product "Sikaflex 2CNS".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Beginning of installation means acceptance of existing substrate and project conditions.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.

3.2 PREPARATION

- A. Field measure site conditions prior to fabrication.
- B. Install starter and edge strips, and cleats before starting installation.
- C. During the installation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 FLASHING INSTALLATION - GENERAL

- A. Except as otherwise shown on the reviewed shop drawings or specified herein, the workmanship of sheet metal work, method for forming joints anchoring, cleating, provisions for thermal movement, etc., shall conform to the standard details and recommendations of the sheet metal producer and those of producer organizations and research institutions and associations concerning the sheet metal used, in addition to the standards and details set forth in the referenced materials specified this Section.
- B. Face nailing will not be permitted, concealed cleating or other concealed method must be used to attach sheet metal work to structure.
- C. Ensure that fastenings do not exceed 8 inches on centers. Use flat head fasteners throughout, and seal all fastener heads after installation thereof.
- D. Fill all slip joints and overlapping surfaces in the assembly with specified sealant material, removing all excess sealant material from the prefinished surfaces immediately, to prevent staining the finish.

3.4 INSTALLATION – ROOF EDGE / FASCIA

- A. Coordinate with roofing installer prior to installation. Verify site conditions and manufacturer's roof edging details. Comply with roof edging manufacturer's installation instructions and recommendations.
- B. Nail galvanized spring clip in continuous manner to vertical face of wood nailers. Locate fasteners 3/4 inch below roof edge and 12 inches on center using a minimum 1-1/2 inch galvanized roofing nail. Allow 1/4 inch gap between sections of spring clip.
- C. Lay roofing membrane over the spring clip allowing it to extend down the face to the drip edge. Locate and hang joint covers at all joints between corners and straight sections.
- D. Hook each fascia section over the top of the spring clip and membrane. Press down on the fascia until the drip edge is engage. Allowed 1/8 to 1/4 inch gap for expansion (as recommended by manufacturer).

3.5 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the provisions of Section 01 45 29 - TESTING LABORATORY SERVICES.

3.6 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

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Section 07 72 00
ROOF ACCESSORIES
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 07 00 02 - ROOFING AND FLASHING TRADE CONTRACT - BID REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 02.

1.2 SUMMARY

- A. Furnish and install the following:
 - 1. Roof access ladders.
 - 2. Prefabricated heat and smoke vents.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 05 31 00 - STEEL DECKING: Metal roof deck.

- G. Section 05 50 00 - METAL FABRICATIONS: Metal curbing.
- H. Section 07 00 02 - ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS. Trade Contract requirements for work of this Section.
- I. Section 07 54 19 - POLYVINYL-CHLORIDE (PVC) ROOFING: Sheet membrane flashings for flanges of curbs, and sheet membrane roofing and flashing system.
- J. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Aluminum fascias and flashings, not otherwise specified herein.
- K. Section 09 91 00 - PAINTING: Field painting of roof accessories.
- L. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Prefabricated elevator penthouse vent, HVAC curbs.
- M. Division 26 - ELECTRICAL: Smoke hatch connections to intrusion detection system.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated by the Hot Dip Process
 - 2. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 - 3. ASTM D 2822 - Asphalt Roof Cement.
 - 4. ASTM E 85 - Test Method for Surface Burning Characteristics of Building Materials.
 - 5. UL - Fire Hazard Classifications
 - 6. FM - Roof Assembly Classifications.
 - 7. All applicable federal, state and municipal codes, laws and regulations for ratings of roof assemblies
- B. The following reference materials are hereby made a part of this Section by reference thereto:
 - 1. NRCA - Roofing and Waterproofing Manual.
 - 2. SMACNA - Architectural Sheet Metal Manual.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each roof specialty item and related accessories furnished hereunder, include data on shape of components, materials and finishes, anchor types and locations.
 - 2. Manufacturer's installation instructions: Indicate interface with adjacent components, and perimeter conditions.

3. Shop drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work. Provide details bearing dimensions of actual measurements taken at the project
4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Exterior-Applied Products (adhesives, sealants, coatings, roofing and waterproofing materials) to demonstrate VOC compliance in accordance with CARB 2007 SCM for Architectural Coatings and SCAQMD Rule 1168 – July 1, 2005.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA details.
- B. Conform to applicable code for UL and FM requirements as applicable to fire rated roof smoke vents. Refer to applicable building codes for roofing requirements and limitations. When a conflict exists, the more restrictive document will govern.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated vents.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Store under cover and protect from weather damage.
- B. Sequence deliveries to avoid delays, but minimize on-site storage time.
- C. Store all materials in an elevated dry location, protected by waterproof coverings.

1.8 PROJECT CONDITIONS

- A. Perform work of this Section when existing or forecasted weather conditions are within the limits established by manufacturers of the materials and products used.

- B. Field Measurements: Do not delay job progress, allow for field tolerances.

1.9 WARRANTY

- A. Provide 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include repair or replacement of roof accessories which exhibit defects in materials or workmanship. Defects is defined as uncontrolled leakage or water and abnormal aging or deterioration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Roof ladders:
 - a. O'Keefes Inc., San Francisco CA.
 - b. ALACO Ladder Company, Chino, CA.
 - c. Precision Stair Corporation, Morristown TN.
 - 2. Smoke vents:
 - a. Babcock-Davis Hatchways, Inc., Arlington MA.
 - b. The Bilco Company, New Haven CT.
 - c. Naturalite/EPI Inc., Garland TX.
 - d. ThyBar Corporation, Addison IL.

2.2 ROOF ACCESS LADDER

- A. Exterior roof access ladder with rail extensions, landing, and safety cage: Factory engineered and prefabricated aluminum ladder with grab bars extending past roof parapet construction, conforming to the following:
 - 1. Extrusion: Aluminum alloy 6061 T-6.
 - 2. Rungs: Deeply serrated not less than 1-1/4 inches in section.
 - 3. Rung load capacity: 1,000 pounds without failure.
 - 4. Stringers: Nominal 3 inch by 1-3/4 inch channel with walls not less than 1/8 inch thick with snap on cover plate.
 - 5. Nominal ladder width between stringers: 24 inches with 36 inch width above top rung of ladder. Provide serrated grab bars at stringer extension above top rung.
 - 6. Finish: Manufacturers standard powder coat finish in RAL color selected by the Architect.
 - 7. Specified manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on O'Keefes Inc., San Francisco CA, Product: "Model No. 503, with optional off-roof bracket".
 - 8. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:

- a. O'Keefes Inc., San Francisco CA.
- b. ALACO Ladder Company, Chino, CA.
- c. Precision Stair Corporation, Morristown TN."

2.3 HEAT AND SMOKE VENTS, UL-LISTED

- A. UL labeled low profile, automatic heat and smoke relief venting units, factory-assembled for installation on roof deck. Vents shall open automatically when pressure within the building exceeds 30 pounds per square foot uplift pressure.
 1. Lids shall be capable of opening against a 10 pounds per square foot simulated snow or wind load and positively lock in wide open position.
 2. Lids shall be capable of supporting a dead or live load of 40 pounds per square foot.
- B. Curb construction: 0.125 inch thick aluminum curb, 12 inches high, containing one-inch thick rigid insulation, and provided with integral cap flashing and 4 inch metal mounting flange.
- C. Lid: Located a minimum of 12 inches above the roof deck, 0.078 inch thick extruded aluminum frame and 080 inch thick aluminum cover containing one inch thick glass fiber insulation, connected directly to curb wall with heavy pintle type hinges. Provide manufacturer's standard full perimeter gasketing.
- D. Lid latch shall allow manual opening from the inside with a pull cord or chain and outside without disturbing latch-fusible link assembly. Latch shall automatically lock the lid when manually closed. Provide manual pull cord in location as directed by the Architect.
- E. Provide manufacturer's standard access control bars consisting of ¾ inch thick steel bars 6 inches on center in one direction and 12 inches on center in the opposite direction. Provide door contacts to be wired into the building fire alarm system. Coordinated with Division 26 – ELECTRICAL.
- F. Operating and latching mechanisms shall be completely enclosed within the unit and not exposed to outside weather.
- G. Furnish units with individual approval labels attached.
- H. Specified manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on The Bilco Company, New Haven CT, Product: "Model No. ACDSH66144.
- I. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
 1. The Bilco Company, New Haven CT.
 2. Babcock-Davis Hatchways, Inc., Arlington MA.
 3. Naturalite/EPI Inc., Garland TX.
 4. ThyBar Corporation, Addison IL.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of existing site conditions.

3.2 INSTALLATION - ELEVATOR PENTHOUSE

- A. Coordinate with installation of roofing system and related flashings for weathertight installation.
- B. Perform the installation in strict accordance with the manufacturer's installation specifications. Install units plumb, level in alignment and plane without warp or rack.
- C. Anchor units securely, fill voids between flutes in steel decking with mineral fiber fireproofing. Solid blocking under roofing membrane to be installed under ladder stringer shoes and over rail shoes.

3.3 ADJUSTING

- A. Touch up damaged coatings and finishes.

3.4 CLEANING

- A. Remove all labels and packing materials from roof accessories, and thoroughly clean all metal surfaces free from dirt, handling marks, and other foreign matter.
 - 1. Do not remove UL labels and "Risk of Fall" or other similar warning labels.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

Section 07 81 00
APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install factory blended, spray applied cementitious fireproofing as indicated on Drawings.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 45 29 - TESTING LABORATORY SERVICES.
- C. Section 01 45 90 – PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS.
- D. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- E. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- F. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- G. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- H. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- I. Section 05 12 00 - STRUCTURAL STEEL.
- J. Section 05 31 00 – STEEL DECK.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES.

Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ASTM E 84 - Test for Surface Burning Characteristics of Building Materials
2. ASTM E 119 - Fire Tests of Building Construction and Materials
3. ASTM E 605 - Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members
4. ASTM E 736 - Cohesive Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
5. ASTM E 759 - Effect of Deflection of Sprayed Fire-Resistive Material Applied to Structural Members
6. ASTM E 760 - Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
7. ASTM E 761 - Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
8. ASTM E 859 - Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members
9. ASTM E 937 - Corrosion of Steel by Sprayed Fire-Resistive Materials Applied to Structural Members
10. UL - Fire Resistance Directory.
11. All applicable federal, state and municipal codes, laws and regulations for fire-resistant construction.

1.4 PERFORMANCE CRITERIA

- A. Materials, procedures for application, dry densities, and thicknesses necessary to provide the required protection shall be tested and rated by UL in accordance with the procedures of UL 263 (ASTM E119) for the uses indicated. Steel members are to be considered restrained unless specifically noted otherwise. Load restricted fire-resistance designs shall be utilized for steel beams and joists
- B. Fire ratings interpolated or extrapolated from actual test data will not be acceptable. Provide evidence prior to application that proposed materials, installation methods and materials have been approved by all authorities having jurisdiction.
- C. Thickness and density: Thickness and dry density of fire protection material shall be according to the manufacturer's data and UL requirements to provide the fire resistance ratings indicated on the Drawings.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and limitations of fireproofing.
 2. Manufacturer's installation instructions and typical details. Indicate any special application procedures or conditions.
 3. Test reports:

- a. Bond strength of fireproofing: Indicate compliance with ASTM E 736.
 - b. Fire test reports of fireproofing application to substrate materials similar to project conditions.
 - c. Reports from reputable independent testing agencies, of product proposed for use, which indicate conformance with ASTM E 119 and ASTM E 84
4. Samples: 3 by 3 inch samples of each type of sprayed fireproofing to be used on the project.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 1. Installers certificate stating that sprayed fireproofing has been completed in full accordance with requirements to provide necessary fire resistance ratings.
 2. Warranties: Include coverage of materials and installation.
- 1.6 QUALITY ASSURANCE
- A. Applicator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
- 1.7 REGULATORY REQUIREMENTS
- A. Provide under Section 01 45 00 - QUALITY CONTROL: an certification by an independent Testing Laboratory acceptable to the Owner that materials, dry densities, thickness, and application procedures satisfy the requirements of the governing laws and building code, and UL requirements, with respect to the minimum protection requirements specified herein when tested in accordance with ASTM E 119.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials, factory proportioned and mixed, in original, unopened packages bearing the name of the product, manufacturer's name, plant identification, lot number and Underwriter's Laboratories, Inc. label.
- B. Store all materials in an elevated dry location, protected by waterproof coverings. Dispose of any materials which have been exposed to moisture. during shipping storage or handling.

1.9 SEQUENCING AND COORDINATION

- A. The installation of ducts, piping, conduit or other suspended equipment shall not take place until the application of sprayed fire protection is complete in an area.
- B. The spray-applied fire resistive material shall only be applied to steel deck, which has been fabricated and erected in accordance with the criteria set forth by the Steel Deck Institute.
- C. The application of spray-applied fire resistive material to the underside of roof deck shall not commence until the roof is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and construction roof traffic has ceased.
 - 1. Fire protection shall not be applied to steel floor decks prior to the completion of concrete work on that deck.
 - 2. When occasional roof traffic is anticipated, as in the case of periodic maintenance, roofing pavers shall be installed as a walkway to distribute loads.

1.10 ENVIRONMENTAL AND PROJECT CONDITIONS

- A. Do not apply spray fireproofing when ambient temperature or surface temperature of substrate material is below 40 degrees Fahrenheit unless temporary protection and heat are provided to maintain temperature at or above this level during application, and 24 hours before and after application.
- B. Provide ventilation in areas to receive fireproofing during and 24 hours after application, to cure fireproofing material.

1.11 WARRANTY

- A. Provide 2 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include failure of fireproofing, including: cracking, checking, dusting, flaking, spalling, separation and blistering. Failure to provide such performance will require re-installation to repair to satisfaction of Owner at no additional cost.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. AD/Carboline, Fireproofing Products Division of RPM Inc., St. Louis MO. ("AD/Carboline")
2. GCP Applied Technologies, Cambridge, MA.
3. Isolatek International, Inc. "CAFECO", Stanhope NJ.
4. Southwest Fireproofing Products Co., Albuquerque, NM ("Southwest").

2.2 MATERIALS

- A. General: Spray applied fireproofing, factory proportioned and mixed meeting the following requirements:
1. Fireproofing materials shall be standard, factory-mixed, Portland cement based dry formulation, complying with indicated fire-resistance design, and mixed with water at project site to form a slurry or mortar before conveyance and application. Dry mixed mineral fiber type fireproofing materials will not be accepted.
 2. Sprayed fireproofing materials shall be free of all forms of asbestos, including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite. Material manufacturer shall provide certification of such upon request.
 3. Fireproofing materials shall not be subject to losses from finished application by sifting, flaking or dusting.
 4. Bare, shop-coated, and galvanized steel sheets with the fireproofing applied shall be kept at 90 degrees Fahrenheit and 70 percent relative humidity for 240 hours without evidence of corrosion of steel, tested in accordance with ASTM E 937.
 5. Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.
 6. Noncombustibility: When tested, the material shall be noncombustible.
 7. Surface Burning Characteristics: When tested in accordance with ASTM E84, the material shall exhibit the following surface burning characteristics:
 - a. Flame Spread 10
 - b. Smoke Developed 0
- B. Spray applied fireproofing Type I – "Standard Density": For structural steel elements including: built-up trusses, steel deck, beams, bracing, and columns, and all other concealed applications except as otherwise indicated on the drawings, or as otherwise specified herein:
1. Acceptable products:
 - a. AD/Carboline, product: "Pyrolite 15HY".
 - b. GCP Applied Technologies, product: "Monokote Type MK-6".
 - c. Isolatek International, product: "Cafco 300".
 - d. Southwest Fireproofing Products Co., product: "5GP".
 2. Deflection: When tested in accordance with ASTM E759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one time vertical centerload resulting in a downward deflection of 1/120th of the span.

3. Bond Impact: When tested in accordance with ASTM E760, the material shall not crack or delaminate from the concrete topped galvanized deck to which it is applied.
 4. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 150 psf.
 5. Air Erosion: When tested in accordance with ASTM E859, the material shall not be subject to losses from the finished application greater than 0.025 grams per sq. ft.
 6. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 750 psf.
 7. Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL design, or as required by the Authority having jurisdiction, or shall have a minimum average density of 15 pcf.
 8. The material shall have been tested and reported by Underwriters Laboratories, Inc. (UL) in accordance with the procedures of UL 263 (ASTM E119).
- C. Spray applied fireproofing Type II – “Medium Density”: Steel columns which are exposed to view and steel framing and steel decking located within elevator shafts:
1. Acceptable products:
 - a. AD/Carboline, product: “Pyrolite 22”.
 - b. GCP Applied Technologies, product: “Monokote Type Z-106”.
 - c. Isolatek International, product: “Cafco 400”.
 - d. Southwest Fireproofing Products Co., product: “7GP”.
 2. Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/UC design or as required by the authority having jurisdiction, or shall have a minimum average of 22 pcf.
 3. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 434 psf.
 4. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 7,344 psf.
- D. Potable water shall be used for the application of sprayed fireproofing materials.
- E. Adhesive and sealer:
1. AD/Carboline, product: “Carboguard 1340”.
 2. W.R. Grace & Company: product as recommended by manufacturer.
 3. Isolatek International, product: “Bond-Seal”.
 4. Southwest, product as recommended by manufacturer.

- F. Mold Inhibitor: Mold inhibitor shall be added to fireproofing materials in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper acceptance of existing substrate and site conditions.
 - 1. Contact fireproofing manufacturer for procedures on handling primed / painted steel.
 - 2. Ensure clips, hangers, supports, sleeves and other attachments to the substrate are placed by applicable trade contractors prior to the application of spray-applied fire resistive materials.

3.2 PREPARATION

- A. Close and seal ductwork in areas where fireproofing is being applied.
- B. Protect adjacent surfaces and equipment from damage by overspray and dusting. Mask adjacent work as required.
- C. Provide temporary enclosures to prevent spray from contaminating air.
- D. Clean substrate of dirt, dust, grease, oil, loose material, or other matter which may effect bond of fireproofing.
- E. Remove incompatible materials which affect bond by scraping, brushing, scrubbing, or sandblasting. Repair or replace any work so damaged and soiled.

3.3 MIXING AND APPLICATION

- A. Mixing shall conform to manufacturer's written instructions.
- B. Materials and equipment shall be as approved by the materials manufacturer. Application shall be by licensed manufacturer's applicators. Procedures shall be in strict accordance with said manufacturer's directions and specifications. Only experienced, skilled mechanics approved by the materials manufacturer shall be allowed to place the materials. A qualified manufacturers representative shall be present for initial application to guide and assist applicator's personnel.
- C. Work shall comply with applicable UL standards in addition to the requirements imposed by the applicable laws and codes, for the indicated ratings, including local pollution control regulations.
- D. Sprayed-on fireproofing shall be applied in the exact manner described in the certificates submitted to prove compliance with specified protection requirements. The fireproofing applicator shall be responsible for providing a controlled application of fireproofing material so that uniform quantity and thickness is maintained.
- E. Manufacturer's recommended sealer shall be applied to all sprayed on fireproofing.

- F. After completion of fireproofing work, equipment shall be removed and all surrounding wall and floor areas cleaned of deposits of sprayed-on fireproofing materials. Where hangers and other surfaces not requiring fireproofing have been sprayed unavoidably, the sprayed material shall be removed and the surfaces made clean.

3.4 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Ensure that applied fireproofing remains exposed to view until verification inspections and testing is made and approval of applied fireproofing is obtain. All costs for removal and replacement of prematurely installed materials to allow inspection of fireproofing shall be borne by the Contractor
- C. Inspection and testing shall verify that applied thickness and density meets manufacturer's tested requirement standards for required fire-resistance ratings.
- D. Where samples fail to meet thickness, quality, or dry density requirements, further sampling and testing will be required in the area of deficient sample. If such further testing indicates a deficient area, correction shall be made by the application of additional material or removal and replacement of faulty material.

3.5 PATCHING

- A. Patch all areas of testing and any area where fireproofing has been damaged or removed during construction.

3.6 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris. Place waste material in suitable bags or containers, and remove from site.
- B. Upon completion of the work of this Section in any given area, clean walls, floors and surrounding surfaces of overspray or drippings. Remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

Section 07 81 23
INTUMESCENT FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide intumescent thin-film coating with protective paint finish for fireproofing of interior steel framing as indicated on the Drawings and as specified herein.
 - 1. All preparatory work of materials and surfaces to receive intumescent paint beyond that specified to be done as work of other Sections, shall be included as work of this Section.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 45 29 – TESTING LABORATORY SERVICES.
- C. Section 01 45 90 – PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS.
- D. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- E. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- F. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- G. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- H. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- I. Section 05 12 00 - STRUCTURAL STEEL.
- J. Section 05 31 00 - STEEL DECK.

1.1 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM D 2240 - Rubber Property - Durometer Hardness.
 - 2. ASTM D 2794 - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

3. ASTM D 3960 - Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
4. ASTM D 4060 - Abrasion Resistance of Organic Coatings by the Taber Abrader.
5. ASTM E 84 - Surface Burning Characteristics of Building Materials.
6. ASTM E 119 - Fire Tests of Building Construction and Materials.
7. ASTM E 595 - Total Mass Loss and Collected Volatile Condensable Materials from Out-gassing in a vacuum Environment.
8. ASTM E 736 - Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
9. ASTM E 759 - Effect of Deflection on Sprayed Fire-Resistive Materials Applied to Structural Members.
10. ASTM E 761 - Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.
11. SSPC - SP1 Solvent Cleaning.
12. SSPC - SP2 Hand Tool Cleaning.
13. SSPC - SP3 Power Tool Cleaning.
14. SSPC – SP6/NACE No. 3 - Commercial Blast Cleaning.
15. WH (Warnock Hersey Testing Services): Fire Resistance Directory.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Ducts, piping, conduit, and other suspended equipment which would interfere with the uniform application of the intumescent coating material shall be positioned after application of intumescent coating system.

1.3 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
2. Samples: Stepped sample panels consisting of manufacturer approved primer as first or lowest layer.. The middle layer is the intumescent fireproofing (white in color). The topcoat is a low VOC protective topcoat as recommended by manufacturer, and in architect's selected color. The finished application will have a smooth paint like finish without orange peel textured appearance.

3. Finish Samples: Sample panels of sprayed-on intumescent thin-film coating on 20 gage (minimum) sheet steel, at least 12 by 12 inches, with proposed thickness, color, and surface finish.
4. Test Reports: Provide certified reports for all specified tests. Submit test designs for intumescent fireproofing prepared by a nationally recognized, certified, independent testing laboratory indicating full compliance with specified fire resistance performance requirements.
5. Certification:
 - a. Provide certification that contractor/applicator utilized for application of intumescent fireproofing are approved by manufacturer and have attended the manufacturer's required application training.
 - b. Provide certification that specialized equipment as may be recommended by manufacturer for proper application of intumescent fireproofing shall be utilized for Work of this section.
6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.

1.4 QUALITY ASSURANCE

- A. Source: For each material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or accessory materials which are acceptable to the manufacturers of the primary materials.
- B. Installer. A firm with a minimum of three years experience in type of work required by this section and which is acceptable to the manufacturers of the primary materials.
- C. Mock-Ups: Prior to commencing the primary work of this section, provide mock-ups at locations acceptable to Architect. Obtain Architect's acceptance of visual

qualities. Protect and maintain accepted mock-ups throughout the remainder of the work of this section to serve as criteria for acceptance of the work. Approved mock-Ups may be incorporated into the finished work.

- D. Material shall conform to all applicable codes and standards, including Commonwealth of Massachusetts State Building Code, and shall be acceptable to all authorities having jurisdiction.

1.5 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Provide mock-up areas using accepted intumescent coating system, minimum 25 square feet, including primer, intumescent coating and topcoat(s). Mock-up shall illustrate color, texture and finish, and demonstrate the minimum standard for the Work.
- C. Apply intumescent coating system mock-up at a typical column where directed for joint approval by representative of intumescent coating system manufacturer, Architect, and local code authority having jurisdiction (if required).
 - 1. Accepted mock-ups may remain as part of the work.
- D. Applications of intumescent coating system in other areas shall not proceed until sample installation is approved.
- E. Approved sample installation shall remain in place and open to observation as a standard for intumescent coating work.

1.6 TESTS

- A. Fire Resistance Ratings: Where fire resistant ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire resistance ratings have been tested in compliance with ASTM E 119 by independent agencies acceptable to the Architect and all authorities having jurisdiction.
- B. Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E 84 are Class A.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory mixed materials in original, unopened packages bearing the name of the product, manufacturer's name, and the Underwriters' Laboratories, Inc. label.
- B. Storage and Protection
 - 1. Store materials in a clean, dry, protected area. Stack containers raised off ground, using blocking or skids to provide drainage.
 - 2. Store materials at temperatures not less than 50 degrees F
 - 3. Protect material from freezing.
 - 4. Discard materials which come in contact with contaminants, water, prior to actual use. Remove damaged materials from Site.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Intumescent fireproofing shall not commence or proceed when steel surfaces are below 60 degrees F or when ambient temperature is less than 60 degrees F or expected within 24 hours.
- B. Relative humidity shall not exceed 60 percent throughout total period of application and drying of intumescent fireproofing, and shall not exceed 85 percent throughout application and drying period for protective decorative finish coat.
- C. Provide ventilation in areas to receive intumescent fireproofing during and for 24 hours following application to dry materials.

1.9 PROTECTION

- A. Provide ventilation in areas to receive intumescent coating system during and 24 hours after application, to properly dry material and maintain nontoxic working area,
- B. Protect adjacent surfaces and equipment from damage. Repair damage so caused. Mask adjacent work as required.

1.10 WARRANTY

- A. Provide certificate stating that intumescent coating system has been completed in full accordance with requirements to provide necessary fire resistance ratings.
- B. Provide warranty stating applied intumescent coating system will remain free from cracks, checking, flaking, and blistering for two years from date of Substantial Completion, and that failure to provide such performance **will** constitute reinstallation or repair to satisfaction of Owner at no additional cost.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Albi Manufacturing (Division StanChem, Inc.), East Berlin CT.
 - 2. Carboline Inc. (RPM Company). St. Louis, MO.
 - 3. International Coatings (Division of AkzoNobel),
 - 4. Isolatek International, Inc. ("CAFCO" Brand), Stanhope NJ.
 - 5. PPG Protective and Marine Coatings, Pittsburgh, PA.
 - 6. Sherwin Williams, Cleveland OH.

2.2 DESCRIPTION

- A. Description: Materials, procedures for application, dry densities, and thickness necessary to provide the required protection shall be approved by UL for the uses indicated. Submit certification by an independent Testing Laboratory acceptable to the Owner that materials, thickness, and application procedures satisfy the

requirements of the governing laws and building code, and UL requirements, with respect to the minimum protection requirements below when tested in accordance with ASTM E 119.

- B. General Characteristics:
1. Provide materials that have been fire tested and classified by Underwriters Laboratories in accordance with ASTM E 84 and ASTM E 119. Underwriters Laboratories Canada (ULC) certification will be acceptable subject to approval of local authorities having jurisdiction.
 2. Fireproofing Performance: Structural steel members throughout the Project to receive intumescent coating system shall be protected under this Section in accordance with UL Ref. 1 to provide the required fire resistance ratings indicated.
 3. System: Contractor shall assume full responsibility for the proper performance of all materials used, for appropriateness of method of application with respect to materials used and substrates encountered, and for the compatibility of any materials applied with shop coats and other coats previously applied, including primers. Follow manufacturers instructions for compatibility check.

2.3 INTERIOR INTUMESCENT FIREPROOFING

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Albi Manufacturing, product "Albi Clad TF".
- B. Interior Intumescent Fireproofing (Type III):
1. Performance Criteria:
 - a. Surface Burning Characteristics (ASTM E 84): rated "Class A".
 - 1) Flame Spread: 0 to 20
 - 2) Smoke Developed: 0 to 50
 - b. Hardness (ASTM D 2240): Shore "D" hardness 45-70 (fully cured).
 - c. Bond Strength: 125 psi minimum when tested per ASTM D 4541 or 40 psi minimum when tested per ASTM D 952.
 - d. Impact Resistance (ASTM D 256): 0.77 foot-pounds/inch of notch.
 - e. Abrasion Resistance (ASTM D4060): maximum 103 mg loss for 1000 cycles.
 2. Products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work include the following:
 - a. Albi Manufacturing, product "Albi Clad TF".
 - b. Carboline, product "A/D Firefilm III".
 - c. International Coatings, product "Interchar 1120".
 - d. Isolatek International, ("CAFECO" Brand), product "Sprayfilm WB-5".
 - e. Sherwin Williams, product "Firetex FX5120".
- C. Primer: As recommended by manufacturer of intumescent paint, fully compatible with furnished intumescent coating.

- D. Protective Finish Topcoat (Required): Single component, low volatile organic compound (VOC compliant) silicone alkyd or acrylic coating, as required by manufacturer, fully compatible with furnished intumescent coating.
 - 1. Finish topcoat will not affect the fire resistance performance of the intumescent fireproofing
 - 2. Color: Nonmetallic gloss or semi-gloss finish, as selected by Architect

2.4 EQUIPMENT

- A. Spray Equipment:
 - 1. Provide airless type equipment recommended by intumescent paint manufacturer. Equipment shall be capable of maintaining rates of pressure measured at spray tip and for volume.
 - 2. Remove filters and screens except displacement pump filter. Position pressure relief hose in material as far away as possible from pump to maximize recirculation of product.
- B. Miscellaneous Equipment:
 - 1. Provide the following equipment as required to suit project conditions and requirements of the intumescent fireproofing manufacturer for application, curing, and finishing of fireproofing system and verification of required fire ratings:
 - a. Dry film thickness gage.
 - b. Air movement equipment.
 - c. Dehumidification equipment.
 - d. Dry electric heat equipment.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Examine surfaces to which intumescent coating system is to be applied, and notify Architect in writing of conditions detrimental to the proper and expeditious application of intumescent coating system which cannot be corrected by normal cleaning of surfaces. Starting of work within an area shall be construed as acceptance of the conditions of that area.
 - 1. Where painted steel is to be fireproofed with intumescent coating, existing paint surface shall be checked for compatibility with intumescent coating prior to fireproofing application.
 - 2. Where compatibility is a problem, existing steel shall be sandblasted and reprimed with acceptable primer material.
- B. Clean surfaces to receive sprayed-on fireproofing, just prior to the application of the fireproofing, with hand tools (SSPC SP 2), power tools (SSPC SP 3), or solvent cleaning (SSPC SP 1) methods to eliminate mill scale, dirt, grime, oil, grease, dust, loose rust or paint, and all other foreign material which would prevent satisfactory bonding of fireproofing to steel.

- C. Application of intumescent coating system shall constitute acceptance of the suitability of the surface to receive this work by the intumescent coating system applicator.

3.2 VENTILATION

- A. Provide ventilation to properly dry all intumescent coatings during and after its application. In enclosed areas lacking openings for ventilation, circulate exterior air and exhaust it to the outside by use of temporary circulators and exhaust fans.

3.3 MIXING AND APPLICATION

- A. Mixing: Thoroughly mix intumescent fireproofing in accordance with manufacturer's instructions and apply in sufficient thickness to achieve the fire resistance rating. Apply in as many passes as necessary to cover, with uniformed texture. Do not add water or solvent to material
- B. Apply intumescent coating system exactly as described in certificates submitted to prove compliance with specified protection requirements. Control application to maintain uniform quality and thickness.
 - 1. Apply intumescent fireproofing in strict adherence with manufacturer's instructions by spray method. Brush or roller application shall be allowed only when spray application is not practical.
 - 2. Spray apply material using heavy duty, self-cleaning (reversible), type tip; 15 mil to 17 mil in size. Increase distance between tip and surface if necessary to reduce orange peel effect due to pressure. Adjust fan width accordingly.
 - 3. Apply a multiple coat application in accordance with UL Ref. 1. Final wet film thickness application shall meet or exceed that required for specified rating.
 - 4. Prior to drying of surface film, all surfaces shall be rolled to remove unsightly drippings or surface irregularities.
- C. Apply intumescent fireproofing in strict adherence with manufacturer's instructions by spray method. Brush or roller application shall be allowed only when spray application is not practical.
- D. Fireproofing material dries quickly, a viscosity increase may be experienced after container has been opened. Keep container covered a much as possible during application. Use recirculation feature on spray equipment at all times, especially at breaks or interruptions during spraying. Hoses shall be purged with water before breaks or interruptions to spraying process.
- E. When applying fireproofing with roller or brush, work from small containers, mixing frequently. Original pail shall be kept tightly closed and surface of material covered with plastic sheet provided for that purpose.
- F. Fireproofing materials are designed for high build with minimum number of coats, however do not exceed 30 mils per wet coat as shrinkage may occur. AD Base coat to be applied at 65-70 mils / coat with a 24 hour drying time between coats.
- G. Drying time between coats will vary with ambient temperature and humidity conditions. Successive coats shall not be applied until previous coat is dry to touch (approximately 2 hours at 70 degrees F and 50 percent relative humidity). Allow a

minimum of 24 hours between application final coat and application of protective topcoat.

- H. Final thickness shall be measured by dry film thickness gage. Do not apply protective top coat until it has been determined that required dry film thickness of intumescent fireproofing has been provided.
- I. Application of Protective Finish Topcoat:
 - 1. Apply protective finish topcoat in strict compliance with manufacturer's instructions by spray method. Brush or roller applications shall be allowed only when spray application is not practical.
 - 2. Spray apply material using manufacturer's recommended airless spray with 2500 pounds per square inch (17.2 MPa) pressure; 0.015 inch (0.4 mm) tip size, and 100 mesh filter.
 - 3. Apply protective finish top coat in compliance with wet and dry film thickness and spreading rates as recommended by manufacturer. Thickness of protective finish coat shall not exceed 4 mils dry per coat.
 - 4. Drying time between coats will vary with ambient temperature and humidity conditions. Successive coats shall not be applied until previous coat is dry to touch (approximately 16 hours at 77 degrees F (25 degrees C) and 50 percent relative humidity).

3.4 FIELD QUALITY CONTROL

- A. Inspection and testing is to be carried out to ensure that applied thickness meet fire rating requirements, and to verify installation meets reviewed test reports,
- B. Correct unacceptable work and pay for further testing required to prove acceptability of installation.

3.5 TOUCH-UP

- A. Recoating and/or repairing of intumescent coating system resulting from cutting or damage by other trades shall be performed under this Section and paid for by the trade doing the cutting or causing the damage.

3.6 CLEAN-UP

- A. Upon completion of intumescent coating system work, clean walls, floors, and surrounding surfaces.

End of Section

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Section 07 84 00
FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install fireproof firestopping, firesafing materials, smoke seals and related accessories required for this Project for all penetrations through fire resistance rated construction, including, but not limited to, penetrations for elevators, plumbing, fire suppression, heating, ventilating and air conditioning, electrical systems, and specialized equipment.
 - 1. Fire resistance rated construction requiring firestopping includes, but is not limited to: floors, rated partitions, smoke barriers, smoke partitions, partitions in rated corridors, passageways and stairs, shaft partitions, shaft wall (vertical and horizontal), area separation fire walls, party wall systems, and temporary fire resistant rated partitions and barriers.
 - 2. Provide removable temporary firestopping (pillows) as required to maintain fire integrity prior to Owner's final acceptance, to permit installation of electrical, telephone, data and sound system wiring. Replace temporary firestopping with permanent, after wiring systems are completed.
- B. Furnish and install firestopping/smoke seals at construction joints occurring at tops of fire resistance rated partitions, smoke partitions, and temporary partitions between top of rated partitions and underside of deck above.
- C. Furnish and install all firestopping, firesafing, and smoke seals at perimeter of floor/roof construction and exterior wall systems, as indicated and where required by applicable codes.
- D. Furnish and install all firestopping, firesafing, and smoke seals at expansion joints in chase walls where expansion joints are not exposed to view.
- E. Furnish and install all firestopping, firesafing, and smoke seals where required by applicable codes and as additionally required by authorities having jurisdiction at no additional cost to the Owner.
- F. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 04 20 00 - UNIT MASONRY: Masonry partitions.
- G. Section 05 31 00 - STEEL DECKING: Metal floor and roof deck.
- H. Section 09 29 00 - GYPSUM BOARD: Gypsum wallboard fireproofing.
- I. Division 21 - FIRE SUPPRESSION: Fire protection system penetrations through fire resistance rated construction.
- J. Division 22 - PLUMBING: Plumbing system penetrations through fire resistance rated construction.
- K. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Heating, ventilating and air conditioning system penetrations through fire resistance rated construction.
- L. Division 26 - ELECTRICAL: Electrical penetrations through fire resistance rated construction.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E-84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E-119 - Method for Fire Tests of Building Construction and Materials.
 - 3. ASTM E-814 - Test Method of Fire Tests of Through-Penetration Firestops.
 - 4. NFPA 70 - National Electrical Code.
 - 5. UL - Fire Resistance Directory.
 - 6. UL 1479 - Fire Tests of Through Penetration Firestops.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide materials and work to conform to Building Code Requirements in fire resistant wall and floor assemblies.

- B. Manufacturer's certified product test requirements:
 - 1. All firestop/smokeseal material shall be tested by a recognized, independent testing agency and shall conform to both Flame (F-rating) and Temperature (T-rating) requirements of ASTM E-814.
 - 2. Conform to UL Fire Hazard Classification Requirements.
 - 3. Tested and classified non-combustible per ASTM E-84.
- C. Firestops in place shall be of sufficient thickness, width, and density to provide a fire resistance rating at least equal to the floor, wall, or partition construction into which it is installed.
- D. Non-combustible dams shall be constructed:
 - 1. As necessary to achieve fire rating as tested and rated.
 - 2. In conformance with installation requirements for type of floor, wall, and partition construction.
 - 3. As recommended by firestop/smokeseal manufacturer.
- E. Combustible damming materials, if used, must be removed after proper curing.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, and physical properties.
 - a. Indicate requirements for manufacturer's descriptive data for products and related materials with FM, UL or Warnock-Hersey illustrations showing systems and approval of materials in systems.
 - 2. Certification: Manufacturer's written certification stating that firestopping materials, meet or exceed the requirements specified under this Section and that all fire-resistive requirements for the indicated combustibility, Flame (F-rating) and Temperature (T-rating) Ratings have been met.
 - 3. Manufacturer's installation instructions.
 - 4. Test reports: Submit fire test reports from recognized, independent testing agent(s) indicating the following:
 - a. Fire test report of firestop material applied to substrate and penetration materials similar to project conditions. Tests to indicate both Flame (F-rating) and Temperature (T-rating) Ratings.
 - b. Test reports of products to be used shall indicate conformance to ASTM E-814.
 - 5. On-site sample installation to be included in Work: Minimum thirty days prior to application in any area, provide samples of firestop and smoke seal materials and installation in accordance with the following requirements.
 - a. Apply one sample of appropriate firestop and smoke seal material for each different penetration and fire rating required for the work.
 - b. Sample areas will comply with thickness, fire resistance ratings, and finished appearance of the project and applicable fire code.

- c. Acceptance samples will constitute standard of acceptance for method of application, thickness, and finished appearance for firestop and smoke seal application. The sample(s) shall remain visible during completion of the work and shall remain as part of the completed work.
- 6. Shop drawings indicating requirements for penetrations in wall/deck intersections, change of planes, control joints, expansion joints and blank openings.
- 7. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.

1.6 QUALITY ASSURANCE

- A. Obtain firestop and smoke seal products from a single manufacturer, except as otherwise approved by Architect.
- B. Environmental Requirements for Volatile Chemicals: Use firestopping caulks that comply with the following limits for VOC content:
 - 1. Firestopping caulks: VOC not more than 250 g/L.
- C. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- D. Special Inspections: Allow for 3 percent of each type of firestopping system to be removed and inspected for conformance with approved submittals.
 - 1. All firestopping shall be inspected prior to installation of suspended ceilings or concealed by other materials.

1.7 QUALIFICATIONS

- A. Installer, a specialized subcontractor having not less than 3 years documented experience demonstrating previously successful work of the type specified herein.

1. The manufacturer of the firestop material shall submit written certification that the firm to be used for the firestop products has been trained in the application of the products by the manufacturer.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire resistance ratings and surface burning characteristics.
- B. Obtain certificate of compliance from authority having jurisdiction indicating approval of combustibility.

1.9 MOCK-UPS

- A. Provide mock-ups under provisions of Section 01 45 00 - QUALITY CONTROL for purpose of verifying quality of firestop installation.
- B. Provide firestop samples and locate as directed. Accepted samples may remain as part of the work.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store firestopping materials in original, sealed, packages showing manufacturer's identification and date of packaging.
- B. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Bio Fireshield (A Division of Rectroseal), Houston TX.
 2. Dow Corning Corporation, Midland MI.
 3. Hilti, Inc. Tulsa OK.
 4. 3M Company, Saint Paul MN.
 5. Specified Technologies, Inc., Somerville NJ.
 6. Metacaulk, (A Division of Rectroseal), Houston TX.
 7. Tremco, Inc., Beachwood OH.

2.2 MATERIALS

- A. Firestop mortar: asbestos free, cementitious mortar, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM/UL1479.
 1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

- a. Bio Fireshield, product "Novasit K-10".
 - b. Specified Technologies, Inc., product "Spec Seal Mortar".
 - c. Tremco Inc., product "Tremstop M".
- B. Silicone Firestop sealant: Single component, non-combustible silicone elastomer firestop sealant, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E-814/UL1479.
1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Bio Fireshield, product product "Biotherm 100" (Gun Grade) or "Biotherm 200" (Self Leveling).
 - b. Specified Technologies, Inc., product "Spec Seal Pensil 300 Sealant (gun grade)" or "Spec Seal Pensil 300SL" (Self Leveling).
 - c. 3M Company, product "Fire Barrier Silicone Sealants".
 - d. Tremco Inc., product product "Tremsil" (Gun Grade) or "Tremsil S/L" (Self Leveling).
 2. Sealants will not dissolve in water.
- C. Intumescent firestop sealant and caulks: Acrylic based, water resistant sealant, which will not re-emulsify after drying.
1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Bio Fireshield, product "Biostop 500".
 - b. Specified Technologies, Inc., product "Spec Seal Triple-S Sealant".
 - c. 3M Company, product "Fire Barrier Caulk CP25WB+".
 - d. Tremco Inc., product "Tremstop 1A".
- D. Firestop putty: sticks or pads.
1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Bio Fireshield, product "Moldable Putty".
 - b. Specified Technologies, Inc., product "Spec Seal Putty Bars and Pads".
 - c. 3M Company, product "Fire Barrier Moldable Putty".
 - d. Tremco Inc., product "Flowable Putty".
- E. Firestop collars: Pre-manufactured fire protective pipe sleeve, UL classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E-814/UL1479.
1. Provide separated (two piece) firestop collar for application when plastic pipe system is already in place. Provide non-separated firestop collar for application prior to installation of plastic pipe system.

2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. 3M Company, Inc., product "Fireshield Firestop Sleeve".
 - b. Specified Technologies, Inc., product "Spec Seal Collars".
 - c. 3M Company, product "Fire Barrier PPD's".
 - d. Tremco Inc., product "Fyrecan sleeve".

- F. Firestop pillows: UL Classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E-814/UL1479.
 1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Bio Fireshield, product "Fireshield Firestop Pillows".
 - b. Specified Technologies, Inc., product "Spec Seal Pillows".
 - c. Tremco Inc., product "Tremstop P.S".

- G. Wrap strips:
 1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Bio Fireshield, product "FS-195".
 - b. Specified Technologies, Inc., product "Spec Seal Wrap Strip".
 - c. 3M Company, product "Fire Barrier FS195 Wrap Strip".
 - d. Tremco Inc., product "Tremco W.S".

- H. Mineral fiber / ceramic wool non-combustible insulation (fire safing): Provide US Gypsum Company product "Thermafiber" having a minimum density of 4 pounds per cubic foot, Fibrex product "FBX Safing Insulation" having a minimum density of 4 pounds per cubic foot, or provide Manville Corporation product "Ceramic Fiber Insulation" having a minimum density of 6 pounds per cubic foot, or approved equal product to suit conditions and complying with firestop manufacturer's requirements.
 1. Provide galvanized steel safing clips as required for installation of insulation.
 2. Material shall be classified non-combustible per ASTM E-814.

- I. Elastomeric Firestopping: Non halogenated latex based elastomeric coating applied by airless spray, Specified Technologies, Inc., product "Spec Seal Elastomeric Firestop Spray".

2.3 ACCESSORIES

- A. Forming and damming materials: Mineral fiberboard or other type as recommended by firestopping manufacturer.
- B. Primer, sealant and solvents: As recommended by manufacturer.
- C. Woven wire mesh: Galvanized 20 gage woven wire mesh "chicken wire" or "poultry fencing", 1 inch spacing.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface to receive firestops shall be free of dirt, dust, grease, oil, form release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating item(s).
- B. Voids and cracks in substrate shall be filled and unnecessary projection removed prior to installation of firestops.
- C. All penetrating items shall be permanently installed prior to firestop installation.
- D. Substrate shall be frost, free and, when applicable, dry.

3.3 INSTALLATION

- A. General
 - 1. Installation of firestops shall be performed by applicators/installers qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
 - 2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations. Meet building code requirements.
 - 3. Coordinate with plumbing, mechanical, electrical, and other trades to assure that all pipe, conduit, cable, and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other construction which would conceal penetrations are not erected prior to the installation of firestops.
 - a. Ensure that all firestopping is inspected prior to installation of suspended ceilings or concealed by other finished materials.
- B. Dam construction
 - 1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating. Combustible damming material must be removed after appropriate curing. Incombustible damming material may be left as a permanent component of the firestop system.
 - 2. Placement of dams shall not interfere with function or adversely affect the appearance of adjacent construction.
- C. Installation of single component silicone firestop
 - 1. Apply with manual or powered caulking gun.

2. Apply minimum 1/2 inch thickness for 2 hour rating. Apply 1/2 inch to both sides of wall penetrations; one side only in floor penetrations.
 3. Use incombustible insulation as required to achieve fire resistance rating.
 4. Surface of gun grade silicone firestop may be tooled using clean, potable water.
 5. Clean excess material off of adjacent surfaces and tools within 10 minutes using either water or Xylol where the use of such would not be hazardous.
- D. Installation of cementitious firestop mortar.
1. Add dry powder to water and mix with mechanical mixer or hand mixing tools as recommended by firestop mortar manufacturer. Allow a average mixing time is 3 minutes and provide a average wet density of 70 pounds per cubic foot, plus or minus 5 PCF.
 2. Do not apply if ambient or substrate temperature is less than 35 degrees Fahrenheit during 24 hours after application.
 3. Wet all surfaces prior to application of firestop mortar.
 4. Mortar may be hand applied or pumped into the opening.
 5. Exposed surfaces shall be finished using conventional plastering tools prior to curing.
 6. When installation around layered cables, it is recommended to increase the fluidity of the firestop mortar to provide a better fill around the cables. Vibrate or move the cables slightly to prevent voids from forming between the cables.
 7. Allow 48 hours for initial cure prior to form removal. For full cure allow 27 days.
 8. Wet material may be cleaned with water. Dry material may require scraping or chipping.
- E. Installation of firestop collars (plastic pipe only)
1. Firestop collars may be surface mounted to a slab or wall or imbedded in Firestop Mortar to a maximum depth of 2 inches.
 2. For wall penetrations with ABS pipe firestop collars must be installed on both sides of the penetration to provide a 2 hour F and T Rating. All other applications required installation on one side only to provide a 2 hour F and T Rating.
- F. Firesafing insulation: Install firestopping safing insulation on safing clips spaced as needed between each stud and floor slab, leaving no voids. Secure safing clips to slab using fasteners recommended by insulation manufacturer. Install sealant over mineral wool in accordance with test requirements.
- 3.4 FIELD QUALITY CONTROL
- A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.
1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
- B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
-

- C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.5 SCHEDULE

- A. General: Typical penetrations are indicated below with list of standard firestopping/smokeseal approaches. Actual firestopping materials and combination of materials will vary with size of penetration and with individual firestopping manufacturer's approved UL Design System Requirements. Use only UL Design System materials for each penetration that best matches the wall and floor construction.
 - 1. Where penetrations occur for which no listed UL or WH Design System test exists, obtain from the firestop system manufacturer an engineered system acceptable to the authorities having jurisdiction for firestopping such penetrations. Engineered system from manufacturer shall include a detail drawing showing the engineered system and shall contain no disclaimers.
- B. Single metal pipe (non-insulated) and conduit penetrations through floors:
 - 1. Firestop mortar.
 - 2. Silicone Firestop sealant.
 - 3. Intumescent firestop sealant.
 - 4. Firestop putty, sticks or pads.
 - 5. Mineral fiber / ceramic wool non-combustible insulation (fire safing) in conjunction with a firestop sealant.
- C. Single metal pipe (non-insulated) and conduit penetrations through walls:
 - 1. (masonry and concrete walls only) Firestop mortar and putty.
 - 2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
 - 3. Intumescent firestop sealant with wrap strips.
- D. Multiple metal pipe and conduit penetrations through floors:
 - 1. Firestop mortar and wrap strips.
 - 2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
- E. Multiple metal pipe and conduit penetrations through walls:
 - 1. Firestop mortar and putty.
 - 2. (through masonry walls only) Firestop pillows with woven wire mesh.
 - 3. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
- F. Insulated metal pipe penetrations through floors:
 - 1. Firestop mortar and wrap strips.
 - 2. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
 - 3. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

4. Silicone Firestop sealant over wrap strip.
 5. Mineral fiber / ceramic wool non-combustible insulation (fire safing) in conjunction with a firestop sealant.
- G. Insulated metal pipe penetrations (single and multiple) through walls:
1. Firestop mortar with wrap strips.
 2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
 3. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) and Wrap strips.
 4. (multiple penetrations through masonry walls only) Firestop pillows with woven wire mesh.
- H. Duct penetrations through floors or walls:
1. Rectangular and square ducts: Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing), and steel flanges provided under Division 15.
 2. Round ducts: Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
- I. Combustible plastic pipe and conduit penetrations through floors:
1. Firestop mortar with wrap strips.
 2. Firestop mortar with firestop putty and firestop collars.
 3. Silicone firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
 4. Silicone firestop sealant and firestop collars.
 5. Intumescent firestop sealant and firestop collars.
 6. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) with firestop collars.
 7. (maximum pipe size 2 inches) Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) with wrap strips.
- J. Combustible plastic pipe and conduit penetrations through walls:
1. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
 2. Intumescent firestop sealant with firestop collars.
- K. Cable penetrations through floors:
1. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
 2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
- L. Cable penetrations through walls:
1. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
 3. (single penetrations only) Firestop putty.
 4. (electrical boxes) Firestop pads.
 5. Firestop putty over mineral fiber / ceramic wool non-combustible insulation (fire safing).
- M. Bus ducts through floors:
1. Firestop mortar and wrap strips.
 2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) and 28 gage (minimum) steel cover plate.
- N. Blank openings:
1. Firestop mortar.
 2. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
- O. Fire rated joints:
1. Silicone Firestop sealant over backer rod or bond breaker.
- P. Floor to curtain wall assemblies:
1. Silicone Firestop sealant/mastic over mineral fiber / ceramic wool non-combustible insulation (fire safing).
- Q. Construction joints at head of wall/floor assemblies:
1. Silicone Firestop sealant/mastic over mineral fiber / ceramic wool non-combustible insulation (fire safing).
 2. Elastomeric spray over mineral fiber / ceramic wool non-combustible insulation (fire safing).
- R. Smoke barrier sealant for dampers, fire door frames:
1. Silicone Firestop sealant.
- S. Temporary sealing of openings and penetrations:
1. Firestop putty, sticks or pads.
 2. Firestop pillows.

End of Section

Section 07 92 00
JOINT SEALANTS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 07 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 07 00 01 - WATERPROOFING, DAMPPROOFING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 07 00 01.

1.2 SUMMARY

- A. General: The work of this Section consists of sealants and backing materials where shown on the Drawings, as specified herein, and as required for a complete and proper installation.
 - 1. This Section specifies general requirements, definition of joint sealer types, and application requirements for sealant work specified within other individual specification sections.
- B. Prepare sealant substrate surfaces.
- C. Furnish and install sealant and backing materials unless otherwise indicated on the Drawings or specifications.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.

- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 03 30 01 – CAST IN PLACE CONCRETE - SITEWORK
- H. Section 04 20 00 - UNIT MASONRY.
- I. Section 06 10 00 - ROUGH CARPENTRY.
- J. Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING TRADE
CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- K. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Sealant integral with flashing.
- L. Section 07 84 00 - FIRESTOPPING: Firestopping sealants and related backing materials.
- M. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Sealant at perimeter of exterior openings.
- N. Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS: Sealant at perimeter of exterior openings.
- O. Section 08 80 00 - GLAZING: Sealant used in conjunction with setting glass.
- P. Section 09 29 00 - GYPSUM BOARD: Application of concealed acoustical sealant used in conjunction with gypsum board work at abutting surfaces (perimeter of partitions, walls and roof decks).
- Q. Section 09 30 13 - CERAMIC TILING.
- R. Section 09 91 00 - PAINTING: Caulks used in preparation of applied finish coatings.
- S. Section 32 13 13 – PEDESTRIAN CONCRETE PAVING

1.4 REFERENCES

- A. The standards referenced herein are included to establish recognized quality only. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
- B. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AASHTO M 220 – Preformed Elastomeric Compression Joint Sealants for Concrete
 - 2. ASTM C 717 - Terms Relating to Building Seals and Sealants.

3. ASTM C 719 – Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement
 4. ASTM C 790 - Use of Latex Sealing Compounds
 5. ASTM C 804 - Use of Solvent-Release Type Sealants.
 6. ASTM C 834 - Latex Sealing Compounds.
 7. ASTM C 919 - Use of Sealants in Acoustical Applications.
 8. ASTM C 920 - Elastomeric Joint Sealants.
 9. ASTM C 962 - Use of Elastomeric Joint Sealants.
 10. ASTM C 1193 - Guide for Use of Joint Sealants.
 11. ASTM C 1247 - Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.
 12. A ASTM C 1330 - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
 13. ASTM D 412 – Test Methods for Rubber Properties in Tension
 14. ASTM D 624 – Test Methods for Rubber Properties – Tear Resistance
 15. STM D 1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 16. ASTM D 2628 – Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
 17. ASTM D 3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
 18. FS TT-S-00227E - Sealing Compound: Elastomeric Type, Multi-Component.
 19. FS TT-S-001543A – Sealing Compound: Silicone Rubber Base
 20. FS TT-S-00230C - Sealing Compound: Elastomeric Type, Single-Component.
 21. FS TT-S-001543A - Sealing Compound, Silicone Rubber Base.
 22. NSF /ANSI 61 – Drinking Water System Components – Health Effects.
- C. The following reference materials are hereby made a part of this Section by reference thereto:
1. SWRI – Sealant and Caulking Guide Specification.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Product Data: Manufacturer's product data sheets, specifications, performance data, chemical and physical properties and installation instructions for each item furnished hereunder.
 2. Selection Samples: Sample card indicating Manufacturer's full range of colors available for selection by Architect.
 3. Verification Samples: 12 inch long samples of sealant for verification of color, installed where directed by Architect.
 4. Certificates: Manufacturer's certification that the Products supplied meet or exceed specified requirements.

5. Test and Evaluation Reports:
 - a. Compatibility and adhesion test reports: Test reports from sealant manufacturer indicating that sealant proposed for use have been tested for compatibility and adhesion with actual samples of substrates to be used on this project. Include sealant manufacturer's interpretation of test results, and recommendations for primers and substrate preparation specific to this Project.
 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Bonds and Warranty Documentation: Manufacturer's standard Warranties and Guarantees.

1.6 COMPATIBILITY

- A. Provide sealant and sealant joint backing materials suitable for the use intended and compatible with the materials with which they will be in contact. Compatibility of sealant and accessories shall be verified by the sealant manufacturer.

1.7 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source: Provide sealants from a single manufacturer for all work of this Section to the greatest extent possible. Each individual type of sealant installed in the Work shall be from a single manufacturer.
- C. Qualifications:

1. Testing Agencies: To qualify for acceptance, an independent testing laboratory must demonstrate to Architect's satisfaction that it has the experience and capability to conduct satisfactory testing indicated without delaying progress of the Work.
 2. Installer: A firm with a minimum of five years experience in type of work required by this Section and which is acceptable to the manufacturers of the primary materials.
- D. Preconstruction Compatibility and Adhesion Testing: Submit samples of all materials that will contact or affect joint sealers to joint sealer manufacturers for compatibility and adhesion testing, as indicated below:
1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates.
 - a. Perform tests under normal environmental conditions that will exist during actual installation.
 2. Contractor shall submit for testing, and sealant manufacturer shall test at least 9 pieces of each type of material, including joint substrates, shims, and joint backer rods.
 3. Schedule testing so that it does not delay the work.
 4. Investigate materials failing these tests and obtain joint sealer manufacturer's written recommendations for corrective measures, including use of specially formulated primers.
 5. The Architect may waive part or all of these specific testing requirements if the sealant manufacturer is able to provide written certification, demonstration to the Architect's satisfaction, that sealant and substrates are compatible and that sealant performance and adhesion will not be compromised by project conditions.
- E. Product Testing: Provide comprehensive test data for each type of joint sealer based on tests conducted by a qualified independent testing laboratory on current product formulations within 24-month period preceding date of Contractor's submittal of test results to Architect.
1. Test elastomeric sealant for compliance with requirements specified by reference to ASTM C920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C719), low-temperature flexibility, modulus of elasticity at 100% strain, effects of heat aging, and effects of accelerated weathering.
 2. Include test results performed on joint sealers after they have cured 1 year.
- F. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:
1. Locate test joints where indicated or, if not indicated, as directed by Architect.
 2. Conduct field test for each type of elastomeric sealant and joint substrate indicated.
 3. Arrange for tests to take place with both Architect and joint sealer manufacturer's technical representative present.
 4. Test Method: Test joint sealers by hand pull method described below:

- a. Install joint sealant in 5-foot joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealant to cure fully before testing.
 - b. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2 inch cuts. Place a mark 1 in. from top of 2 inch piece.
 - c. Use fingers to grasp 2 inch piece of sealant above 1 in. mark; pull firmly down at 90 degree angle or more while holding a straightedge along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
5. Report whether or not sealant in joint connected to pull-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 6. Evaluation of field test results: sealant not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealant which fail to adhere to joint substrates during testing.

1.8 MOCK-UPS

- A. Submit the following under provisions of Section 01 45 00 - QUALITY CONTROL:
- B. Field Constructed Mock-Ups: Prior to installation of joint sealers, apply elastomeric sealant to building joints in mock-ups for further verification of colors selected from sample submittals and to represent completed Work for qualities of appearance, materials, and application:
 1. Joints in field-constructed mock-ups of assemblies specified in other Sections which are indicated to receive elastomeric joint sealant specified in this Section.
 2. Retain accepted mock-ups during construction as standard of quality for judging completed construction.
- C. Accepted mock-ups may not remain as part of the work; the number of mock-ups shall not be restricted.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Each container and package must bear an unbroken seal, test number and label of the manufacturer upon delivery to the site. Failure to comply with these requirements shall be sufficient cause for rejection of the material in question, by the Architect and his requiring its removal from the site. New material conforming to said requirements, shall be promptly furnished at no additional cost to the Contract.

1.10 SITE CONDITIONS

- A. Do not install single component solvent curing sealant in enclosed building spaces.

- B. Environmental Requirements: Maintain temperature and humidity recommended by the sealant manufacturer during and 24 hours after installation. Do not proceed with installation of joint sealers under the following conditions:
 - 1. When ambient and substrate temperature conditions are below 40 degrees F.
 - 2. When joint substrates are wet due to rain, frost, condensation, or other causes.
- C. Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from substrates.
- D. For exterior joint sealants:
 - 1. Weather: Perform work of this Section only when existing or forecasted weather conditions are within the limits established by manufacturers of the materials and products used.
 - 2. Substrates: Proceed with work only when substrate construction and penetration work is complete.

1.11 WARRANTY

- A. Provide 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include coverage of installed sealant and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturers and Products: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products specified under this section for each individual sealant type, for the applications scheduled at the end of Section, and as may be additionally identified on the Drawings.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Dow Corning Corporation, Midland MI.
 - 2. Emseal Joint Systems Ltd., Westborough MA.
 - 3. Pecora Corporation, Harleysville PA.
 - 4. Polytite Manufacturing Corporation, Cambridge MA.
 - 5. Sandell Manufacturing Company, Schenectady NY.
 - 6. Sika Corp, Lyndhurst NJ.
 - 7. Sonneborn Building Products Inc., Minneapolis MN.
 - 8. STS Coatings, Inc., Comfort TX.
 - 9. Tremco, Inc., Beachwood OH.
 - 10. Williams Products Inc., Troy MI.
 - 11. York Manufacturing, Inc., Sanford ME.

12. Willseal, LLC, Hudson, NH.

2.2 SEALANT MATERIALS

- A. Sealant Materials, General Requirements:
1. Only use sealant and primers that comply with the following limits for VOC content:
 - a. Architectural Sealants: 250 g/L.
 - b. Roofing Sealants: 450 g/L.
 - c. Roadway Sealants: 250 g/L.
 - d. Sealant primer: 250 g/L.
 2. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, PCBs, cadmium, chromium and their compounds, are not permitted.
- B. Joint Sealer Type AA (Acrylic acoustical): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable.
1. Tremco, product "Acoustical Sealant".
 2. USG, product "USG Acoustical Sealant".
 3. Pecora, product "AC-20 FTR".
- C. Joint Sealer Type AP (Acrylic caulk): One component acrylic latex caulking compound, conforming to FS 19-TP-21M and ASTM C 834, paintable within 24 hours after application, with a minimum movement capability of ± 12.5 percent, equal to one of the following:
1. Sonneborn, product, "Sonolac".
 2. Tremco, product, "Tremflex 834".
 3. Pecora, product "AC-20+".
- D. Joint Sealer Type BP2 (Bitumen modified polyurethane, Multi-component): Pouring grade self-leveling bitumen modified two component urethane sealant, conforming to ASTM C920, Type M, Grade P, Class 25 and FS SS-S-00227E, Type 1, Class A, with a minimum movement capability of +50/-25 percent, equal to one of the following:
1. Tremco, product "Vulkem 202".
 2. Sonneborn, product "Sonomeric 2".
 3. Pecora, product "Urexpan NR-300".
- E. Joint Sealer Type FSB (Expanding Foam type backer sealant): Low modulus secondary expanding foam sealant fabricated from stabilized acrylic impregnated expanding foam sealant and cross-linked ethylene vinyl acetate (EVA) closed cell foam equal to one of the following:
1. Willseal, LLC, product, "Willseal 600" (basis of design).
 2. Emseal, product "Backerseal".
 3. Schul (Sealtite Brand), product "Sealtite B".
 4. Tremco, product "illmod 600".

- F. Joint Sealer Type FC (Expanding Foam-Colored): Low modulus silicone faced and impregnated expanding foam sealant.
1. Performance Properties:
 - a. Shore A hardness per ASTM D 2240: 15 pts.
 - b. Staining per ASTM C 510: None.
 - c. Xenon arch weathermeter for 2000 hours per ASTM G26-77: No visible deterioration or performance change.
 - d. Surface weathering for 6000 hours per ASTM G26-77: Minimal hardness change.
 2. Color: As selected from manufacturers full range of colors.
 3. Acceptable products:
 - a. Emseal, product "ColorSeal".
 - b. Schul (Sealtite Brand), product "Color Econoseal".
 - c. Williams, product "Everlastic Wide Joint Seal".
- G. Joint Sealer Type HL1 (Horizontal-self-Leveling, 1-component): Pouring grade self-leveling modified urethane or neutral cure silicone sealant, conforming to FS TT-S-000230C, Type I, Class A, and ASTM C 920 Type S, Grade P, Class 25, with a minimum movement capability of ± 25 percent, equal to the following:
1. Sika, product, "Sikaflex 1CSL" (urethane).
 2. Sonneborn, product, "SL1" (urethane).
 3. Tremco, product "Vulkem 45" / 45 SSL (urethane).
- H. Joint Sealer Type HL2 (Horizontal-self-Leveling, 2-component): Pouring grade self-leveling multi-component urethane sealant, conforming to FS TT-S-000227E, Type I, Class A, and ASTM C 920, with a minimum movement capability of ± 25 percent, equal to the following:
1. Sika, product, "Sikaflex 2CSL".
 2. Sonneborn, product, "SL2".
 3. Tremco, product, "THC-900 / THC-901".
- I. Joint Sealer Type HT (Horizontal-Trowel): Trowel grade multi-component modified-urethane or neutral-cure silicone paste sealant, conforming to FS TT-S-000227E, Type I, Class A, and ASTM C 920, with a minimum movement capability of ± 25 percent, equal to the following:
1. Pecora, product "Dynatred" (urethane).
 2. Sika, product "Sikaflex 2CTG" (urethane).
 3. Sonneborn, product "SL2 (slope grade)" (urethane).
 4. Tremco, product "THC-901" (urethane).
- J. Joint Sealer Type P1 (Polyurethane 1-component): Low modulus single component gun-grade polyurethane sealant, non-sagging, conforming to FS TT-S-000230C, Type I, Class A, and ASTM C 920, Type S, Class 12-1/2, Grade NS, use NT, M, A and O with a minimum movement capability of ± 25 percent, equal to the following:
1. Pecora, product "Dynatrol I".
 2. Sika, product "Sikaflex".

3. Sonneborn, product "Sonolastic NP1".
 4. Tremco, product "Vulkem 116", or "Dymonic".
- K. Joint Sealer Type P2 (Polyurethane, Multi-component): Low modulus type, Multi-component non-sagging gun-grade polyurethane sealant, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type M, Class 25, Grade NS, use NT,M, A and O with a minimum movement capability of ± 50 percent, equal to the following:
1. Tremco, product "Dymeric 240 / Dymeric 240FC".
 2. Sonneborn, product "Sonolastic NP2".
 3. Pecora, product "Dynatrol II".
 4. Sika, product "Sikaflex 2CNS".
- L. Joint Sealer Type PE (Polyether): Low modulus type, Single-component non-sagging gun-grade, low-odor, neutral curing polyether, sealant, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type S, Class 25, Grade NS, use NT, T, M, G, A and O with a minimum movement capability of ± 25 percent, equal to the following:
1. STS Coatings, product "GreatSeal PE-150" Sealant.
 2. Chem Link, product "MetaLink".
 3. Sonneborn, product, "Sonolastic 150".
 4. York Manufacturing, product: "PE-150 Liquid Tape".
- M. Joint Sealer Type SC (Silicone, general construction): One-part medium modulus, natural cure, synthetic sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, use NT, G, A, M, O with a minimum movement capability of ± 50 percent, equal to the following:
1. Dow Corning, product, "791".
 2. Pecora, product, "895".
 3. Sika, product, "Sika Sil-C 995".
 4. Sonneborn, product, "Sonolastic - OmniSeal".
 5. Tremco, product, "Spectrem 2".
- N. Joint Sealer Type SE (Silicone, Exterior construction): One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, FS TT-S-001543A, Type, Class A with a minimum movement capability of +100 percent and -50 percent, equal to the following:
1. Dow Corning, product, "790".
 2. Sika, product "Sika Sil-C 990".
 3. Tremco, product "Spectrem 1".
- O. Joint Sealer Type SM (Silicone, Mildew-resistant): USDA approved one component acetoxysilicone rubber, mildew resistant, acceptable to local health officials, conforming to U.S. Food and Drug Administration regulation 21 CFR 177.2600, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Class 25, Grade NS, use NT,G and A with a minimum

movement capability of ± 25 percent, and a Shore A hardness of 20, equal to the following:

1. Dow Corning, product "786".
 2. Sonneborn, product "Sonolastic - OmniPlus".
 3. Tremco, product "Tremsil 200".
 4. Pecora, product "898".
- P. Joint Sealer Type SF (Silicone, Food contact): one component silicone rubber, acceptable to local health officials, conforming to U.S. Food and Drug Administration regulation 21 CFR 175.105 and 175.300, FS TT-S-001543A, Type Non-Sag, Class A, and ASTM C 920, Type NS, Class 25, Use NT, G, O and A with a minimum movement capability of ± 25 percent, and a Shore A minimum hardness of 20, equal to the following:
1. Dow Corning, product, "732".
- Q. Joint Sealer Type PRS (Preformed Resilient Joint Sealer): for use at expansion joints in exterior concrete walls where specifically called for on Drawings shall be preformed, resilient, extruded polychlorophrene elastomeric joint sealer, conforming to ASTM D 2628 and AASHTO M 220 of indicated configuration(s), in continuous lengths, set in manufacturer's recommended primer-lubricating-adhesive consisting of moisture curing polyurethane and aromatic hydrocarbon solvent mixture (73% solid by weight) concrete gray color, equal to one of the following:
1. D.S. Brown Co.
 2. Watson Bowman & Acme Corp.

2.3 ACCESSORIES

- A. Compressible joint bead back-up: Compressible closed cell polyethylene, extruded polyolefin or polyurethane foam rod complying with ASTM C 1330, Type C, 1/3 greater in diameter than width of joint. Shape and size of compressible back-up shall be as recommended by manufacturer for the specific condition used. Provide one of the following, or equal.
1. Construction Foam Products (Division of Nomaco, Inc.), Zebulon, NC, product "HBR Closed Cell".
 2. Industrial Thermo Polymers Ltd., Brampton, Ontario CN, product "ITP Standard Backer Rod".
 3. BASF Construction Chemicals (Sonneborn), Shakopee MN, product "Sonolastic Closed Cell Backer Rod".
 4. W.R. Meadows Inc., Hampshire, IL, product "Sealtight Kool-Rod".
- B. Primers: Furnish and install joint primers of the types, and to the extent, recommended by the respective sealant manufacturers for the specific joint materials and joint function.
- C. Bond-breaker tape, and temporary masking tape: Of types as recommended by the manufacturer of the specific sealant and caulking material used at each application, and completely free from contaminants which would adversely affect the sealant and caulking materials.

- D. Backer Rod: Provide closed cell compressible rod of durable nonabsorptive material recommended by sealant manufacturer for compatibility with sealant, conforming to ASTM C 1330. Provide products of one of the following manufacturers:
 - 1. Backer Rod Manufacturing and Supply Co.
 - 2. Dow Chemical Co.
 - 3. W.R. Meadows, Inc.
 - 4. Williams Products, Inc.
 - 5. Woodmont Products, Inc.
- E. Joint backing for general use at joints in horizontal surfaces shall consist of two rows of butyl rubber or neoprene foam rod in contact with one another, and each compressed to approximately 2/3 original width when in place.
- F. Provide miscellaneous materials of type that will not bleed through sealant, discolor surface, or produce other deleterious effects. Select size to provide compression to approximately 2/3 original width when in place. Provide backing material profile concave to the rear of the sealant, and equipped with a bond-breaking film.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General:
 - 1. Weather conditions must be dry and of the temperature, as recommended by sealant manufacturer, during application operations.
 - 2. Surface receiving work of this section must be absolutely dry and dust free. All joints receiving sealant/caulking materials and primers shall be subject to the approval of the sealant manufacturer for proper use of specified materials.
- B. Thoroughly clean all joints, removing all loose mortar, oil, grease, dust, frost, and other foreign materials that will prevent proper adhesion of primers and sealant materials.
 - 1. Clean ferrous metals of all rust and coatings by wire brush, grinding or sandblasting. Remove oil, grease and protective coatings with cleaners recommended by sealant manufacturer.
- C. Prime joint substrates, as recommended in writing by joint-sealant manufacturer, as based on preconstruction joint-sealant-substrate tests or as based upon prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- D. Verify that joint backing and release tapes are compatible with sealant.
- E. Perform preparation in accordance with ASTM C 804 and C 790 for solvent and latex base solvents, respectively.

3.3 INSTALLATION

- A. General: Conform to SWRI requirements, and sealant manufacturer's written requirements for installation.
- B. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.
 - 1. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
- C. Install bond breaker in joints where shown in the Drawings and wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.
- D. Apply masking tape or other precautions to prevent migration or spillage of materials onto adjoining surfaces.
- E. Apply urethane sealant and latex caulking materials into joints in accordance with manufacturer's instructions, using mechanical or power caulking gun equipped with nozzle of appropriate size, with sufficient pressure to completely fill the joints.
 - 1. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
 - 2. Maintain the outer edge of the sealant and caulking materials, where side faces of joints are in the same plane back 1/8-inch from the faces.
 - 3. Apply sealant in continuous beads without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length.
 - 4. After placement of the sealant and caulking materials, concave-tool the surfaces to uniform density, using a dry tool. Do not use detergents or soapy water for the tooling operations.
 - 5. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.
- F. Take care not to block-off weep tubes or any through wall opening constructed to allow weeping of accumulated water.
- G. Apply pouring self-leveling urethane sealant (Sealant designation HL) into horizontal joints in accordance with manufacturer's instructions, to a level approximately 1/16 inch below adjacent surfaces.
 - 1. Apply sealant without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length.
 - 2. After placement of the sealant and caulking materials, concave-tool the surfaces to uniform density, using a dry tool. Do not use detergents or soapy water for the tooling operations.

3. Remove the temporary masking tape immediately after tooling, and before the sealant has taken initial set.

3.4 INSTALLATION PRE-FORMED FOAM SEALANTS

- A. General: The joint configuration and the joint surfaces shall be as detailed in the Drawings and in accordance with the current material Tech Data available from the Manufacturer. Field measurements of the depth and width of the joint shall be supplied to manufacturer before material is ordered.
- B. Joint sealer/expansion joint material to be installed in strict accordance with the manufacturer's instructions.
 1. Installed each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material.
 2. Install in manner to provide seal continuity at ends, turns and intersections of joints.
 3. Remove all strip-off waste materials and excess foam sealant from site immediately upon completion of work.
- C. Provide additional wet seal joints at joints recommended by foam sealant manufacturer.

3.5 INSTALLATION – EXTERIOR JOINT SEALANTS

- A. Schedule work as long as possible after completion of concrete work and finished brick paving and granite work.
- B. Provide backer rods for liquid sealants except where specifically recommended against by sealant manufacturers.
- C. Prevent three sided adhesion by use of bond breaker tapes or backer rods.
- D. Force sealant into joints to provide uniform, dense, continuous ribbons free from gaps and air pockets. Completely wet both joint surfaces equally on opposite sides.
- E. Except in hot weather, make sealant surface slightly concave. Install sealants so that compressed sealants do not protrude from joints. Dry tool sealants to form a smooth dense surface. At horizontal joints form a slight cove to prevent trapping water.
- F. Provide sealants to depths indicated, or if not indicated, follow manufacturer's recommendations. For joints up to 3/8 in. width, depth of joint shall not exceed 1/2 in. 3/8 in is the maximum acceptable joint width.
- G. General Extent of Sealants: Seal joints indicated, and all exterior joints, seams, and intersections between dissimilar materials. Provide elastomeric sealant installation with backer rod in all exterior control joints.
- H. Cure sealants in strict compliance with manufacturers' instructions and recommendations to obtain highest quality surface and maximum adhesion. Make every effort to minimize accelerated aging effects and increase in modulus of elasticity.

3.6 CLEANING

- A. Clean all surfaces of adjacent surfaces which have been marked or soiled by the work of this Section, removing all excess sealant and caulking materials with solvents which will not damage the surfaces in any way.

3.7 PROTECTION

- A. During the operation of sealant work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.8 SCHEDULE

- A. General: Seal joints indicated and all interior and exterior joints, seams, and intersections between dissimilar materials. Unless otherwise noted, all scheduled joint sealants shall be provided under this section.
- B. Sealant Colors:
1. Colors for Sealant Types "HL2": Match colors furnished by the Architect, or match other building materials as directed. Should such custom colors not be available from the approved manufacturer, except at additional charge, provide all such colors at no change in Contract Sum.
 2. Colors for Sealant Types "HT", "SC", "SE", "SM" and "SX": As selected by the Architect from manufacturer's standard colors.
 3. Color for Sealant Types "AA" and "AP": White.
 4. In concealed installation, and in partially or fully exposed installation where so approved by the Architect, standard gray or black sealant may be used.
- C. Specialty Joint Conditions: None.
- D. Exterior joints (Listed by primary building material abutting sealant joints):

1. Concrete (including precast):	
<u>Joint Condition</u>	<u>Sealant Type</u>
a. Concrete to concrete, vertical control joints:	SE
b. Concrete foundation walls to abutting concrete, and other non-bituminous pavements, steps, platforms, and ends of ramp, (horizontal joints):	HL2
c. Concrete slabs on grade to abutting non-bituminous pavements (horizontal joints, including pedestrian traffic surfaces):	HL2
d. Concrete to concrete saw cut and tooled control and isolation joints in horizontal surfaces including pedestrian traffic surfaces:	HL2
e. Concrete and non-bituminous sloped (5% to 12%) pavement ramps (horizontal joint) at abutting concrete or masonry foundation walls:	HT
f. Concrete to all items which penetrate exterior concrete walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SE
g. Precast concrete to abutting materials (vertical	SE

- joints):
- h. Exterior Concrete Paving (as shown on Drawings, between concrete pours and at all fixed vertical elements): P2
2. Exterior Masonry:
- | Joint Condition | Sealant Type |
|--|--------------|
| a. Masonry to masonry, expansion and control joints: | SE |
| b. Masonry to abutting masonry or concrete: | SE |
| c. Masonry to abutting non-porous materials (painted metals, anodized aluminum, mill finished aluminum, PVC, glass, and similar materials):
Sealant of aluminum windows to masonry shall be provided by 08 51 13 Aluminum Windows. Sealant of aluminum curtain wall systems to masonry shall be provided by 08 44 13. | SE or SX |
| d. Masonry to all items which penetrate exterior masonry walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items: | SE |
| e. Masonry to through-wall flashing shall be provided by Section 04 20 00. | |
3. Exterior Metal:
- | Joint Condition | Sealant Type |
|---|--------------|
| a. Metal to metal: | SX |
| b. Sealant of aluminum windows to metal panel shall be provided by 08 51 13 Aluminum Windows. Sealant of aluminum curtainwall systems to metal panel shall be provided by 08 44 13. | |
| c. Metal to glass: | SX |
- E. Interior joints (Listed by primary building material abutting sealant joints):
1. Interior Concrete:
- | Joint Condition | Sealant Type |
|--|--------------|
| a. Concrete to concrete (including precast), vertical joints: | SC |
| b. Concrete and non-bituminous pavement ramps (5 to 12 Percent) horizontal joints at abutting vertical concrete or masonry surfaces: | HT |
| c. Precast concrete to abutting materials (vertical joints): | SC |
- 3.9 Interior Masonry: * Includes interior side of exterior masonry walls.
- | Joint Condition | Sealant Type |
|------------------------------|--------------|
| a. Sealant at Elevator Room: | SC |
2. Gypsum Board:
- | Joint Condition | Sealant Type |
|--|--------------|
| a. Gypsum board to metal or wood trim: | AP |
| b. Gypsum board to gypsum board at exterior wall deflection track: | SC |
| c. Gypsum board to interior door and window frames, | AP |

ceramic tile, penetrating conduits and piping:

3. Architectural millwork and casework:
- | Joint Condition | Sealant Type |
|---|--------------|
| a. Casework to abutting materials, kitchens, toilet rooms and similar "wet spaces": | SM |
| b. Casework to abutting surfaces (except in "wet" spaces): | AP |
| c. Countertops to abutting wall surfaces and to abutting casework: | SM |
| d. Countertops to plumbing fixtures and fittings: | SM |
| a. Countertops to backsplashes (including epoxy): | SM or SF |
4. Interior metal:
- | Joint Condition | Sealant Type |
|--------------------|--------------|
| a. Metal to metal: | SC |
5. Interior floor drains:
- | Joint Condition | Sealant Type |
|--|--------------|
| a. Floor drains to concrete slab: | SE |
| b. Floor drains to resilient sheet flooring: | SE |
6. Tile:
- | Joint Condition | Sealant Type |
|---|--------------|
| a. Tile to tile vertical, and horizontal non-traffic joints: | SM |
| b. Tile to interior door and window frames, penetrating conduits and piping (provide full perimeter sealant where plumbing fixtures abut tile), light-fixtures, electrical cover plates, building specialty items, ductwork, grilles, supply diffusers, faucets, piping, escutcheon plates and similar items: | AP |
7. Resilient Flooring
- | Joint Condition | Sealant Type |
|--|--------------|
| a. Resilient flooring to dissimilar surfaces including hollow metal frames, plastic laminate, solid surface: | HL2 |
8. Miscellaneous Interior:
- | Joint Condition | Sealant Type |
|--|--------------|
| a. Solid surface to abutting materials: | SC |
| a. All toilet room fixtures, urinals, toilet, shower stall perimeters: | SM |
9. Provide joint sealants at all locations indicated on the drawings and noted under 07 92 00, or joint sealants not specifically noted by other divisions. Should there be a conflict where sealants are noted under 07 92 00 and another specific section, this section shall be included in the base cost under 07 92 00.

End of Section

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Section 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install expansion joint cover assemblies of design, basic profile, materials, and operation indicated. Work includes but is not limited to:
 - 1. Prefinished interior joint assemblies for floors, walls and ceiling/soffit surfaces.
- B. Furnish the following products to be installed under the designated Sections:
 - 1. Placement of joint assembly frames in formwork by Section 03 30 00 - CAST-IN-PLACE CONCRETE.
 - 2. Placement of joint assembly and frames in masonry by Section 04 20 00 - UNIT MASONRY.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Placement of joint assembly frames in formwork.

- H. Section 04 20 00 - UNIT MASONRY: Placement of joint assembly frames in masonry.
- I. Section 05 50 00 - METAL FABRICATIONS: Custom fabricated steel expansion and control joint devices.
- J. Section 07 42 43 – COMPOSITE WALL PANELS: Joint construction in composite panel construction.
- K. Section 07 54 19 – POLYVINYL CHLORIDE (PVC) ROOFING: Joint construction in PVC roof construction.
- L. Section 07 92 00 - JOINT SEALANTS: Expansion and control joint finishing utilizing a sealant.
- M. Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES: Joint construction adjacent to door and frame construction.
- N. Section 09 21 17 – SHAFT WALL ASSEMBLIES: Wall substrates for installing joint assemblies.
- O. Section 09 29 00 - GYPSUM BOARD: Soffit and wall substrates for installing joint assemblies.
- P. Section 09 30 13 – CERAMIC TILING: Joint construction in ceramic tile construction.
- Q. Section 09 51 00 - ACOUSTICAL CEILINGS: Joint construction in ceiling panels.
- R. Section 09 64 29 – WOOD STRIP AND PLANK FLOORING: Joint construction in wood strip floor construction.
- S. Section 09 64 66 – WOOD ATHLETIC FLOORING: Joint construction in athletic wood floor construction.
- T. Section 09 65 23 – RUBBER FLOORING: Joint construction in rubber floor construction.
- U. Section 09 65 43 – LINOLEUM FLOORING: Joint construction in linoleum floor construction.
- V. Section 09 68 13 – TILE CARPETING: Joint construction in carpet tile construction.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 - 2. ASTM C 864 - Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 - 3. ASTM C 920 - Elastomeric Joint Sealants.
 - 4. ASTM D 1187 - Asphalt Base Emulsions for Use as Protective Coatings for Metal.

5. ASTM D 2287 - Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
6. ASTM E 84 - Surface Burning Characteristics of Building Materials.
7. ASTM E 119 - Test Methods of Building Construction and Materials.
8. ASTM E 1399 - Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.
9. NAAMM, applicable publications.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, profile dimensions, types of anchorage devices for each type of joint cover assembly furnished hereunder.
 2. Manufacturer's installation instructions: Indicate rough-in sizes; provide templates for cast-in or placed frames or anchors; required tolerances for item placement.
 3. Shop drawings: Large scale design details of joint assemblies showing joint and splice locations, miters, layout of the work, affected adjacent constructions, anchorage locations and complete installation details.
 4. Selection samples: Finished metal samples, indicating Manufacturer's full range of colors available for selection by Architect.
 5. Verification samples: 12 inch long samples of joint a cover assemblies, illustrating profile, dimension, color, and finish selected.
 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.5 QUALITY ASSURANCE

- A. Obtain products required for the Work of this Section from a single manufacturer, except as otherwise acceptable to the Architect/Engineer.
- B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier.

1.7 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.8 SEQUENCING AND SCHEDULING

- A. Provide all necessary templates and rough-in measurements required for installation of expansion control assemblies. Coordinate formed blockouts and recesses in concrete to receive joint cover assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on products from Watson Bowman Acme Corporation (A Division of BASF Construction Chemicals), Amherst NY.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Watson Bowman Acme Corporation (A Division of BASF Construction Chemicals), Amherst NY
 - 2. Balco, Inc, Wichita KS.
 - 3. Construction Specialties, Inc, Muncy, PA.
 - 4. MM Systems Corporation, Pendergrass GA.
 - 5. Nystrom Building Products, Brooklyn Park MN.

2.2 EXPANSION JOINTS, GENERAL REQUIREMENTS

- A. General: Provide expansion joint cover assemblies of design, basic profile, materials and operation indicated required to accommodate joint size variations in adjacent surfaces, and as required for anticipated structural movement.
 - 1. Provide units comparable to those indicated or required to accommodate joint size, variations in adjacent surfaces, and dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399.

2. Furnish units in longest practicable lengths to minimize number of end joints. Provide hairline mitered corners where joint changes directions or abuts other materials.
 - a. Include closer materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint cover assemblies.
 - B. Fire-Resistance Systems:
 1. Provide expansion joint cover assemblies identical to those of assemblies whose fire resistance has been determined per ASTM E119 and E814, NFPA 251, or UL 263 including hose stream test at full-rated period.
 - a. Thermal insulation: Include thermal insulation where necessary, in accordance with above tests, with factory cut miters and transitions.
 2. Fire rating: Not less than rating of adjacent floor or wall construction.
 - C. Metal Floor-to-Floor Joint Cover Assemblies:
 1. Provide continuous extruded metal frames of profile indicated with seating surface and concealed bolt and anchors embedded in concrete.
 2. Provide assemblies formed to receive cover plates of design indicated. Furnish depth and configuration to suit type of construction and to produce a continuous flush wearing surface with adjoining finish floor surface.
 3. Provide self-centering cover plates with concealed centering device secured in, or on top of frames.
 - D. Floor-to-Wall Joints: Provide one frame on floor side of joint only. Provide wall side frame where required by manufacturer's design.
 - E. Interior Wall, Ceiling, and Soffit Joint Cover Assemblies:
 1. General: Interior wall and ceiling expansion joint cover assemblies shall be of same design and appearance. Interior wall and ceiling expansion joint cover assemblies shall have the following features:
 - a. Provide cover assemblies designed for flush mounting with not exposed fasteners, except as specifically scheduled or indicated otherwise.
 - b. Extend cover to lap each side of joint and to permit free movement on one side.
 - c. Use angle cover plates at intersection of walls.
- 2.3 ACCESSORIES:
- A. Flame Sealant: Manufacturer's intumescent sealant to remain resilient to permit joint movement and, upon exposure to heat, resist penetration of fire through voids in construction.
 - B. Non-Shrink Grout: Premixed, factory packaged, non-ferrous aggregate, non-staining, shrinkage-resistant, non-corrosive, non-gaseous, ASTM C1107.
 1. Minimum Strength at 28 Days: 5000 PSI.

2.4 FACTORY FINISHING

- A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes to products in factory after fabrication. Protect finishes on exposed surfaces before shipment.
 - 1. Architectural Class I anodic coating, (AA designation M12C22A31) 0.4 mil thickness or greater, prepared with a mechanical M12, chemical C22 pre-treatment, clear anodized in color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that joint preparation and affected dimensions are acceptable.
- B. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Provide anchoring devices for installation and embedding, as detailed. Comply with manufacturer's instructions and recommendations for phases of Work, including preparing substrate, applying materials, and protecting installed units.
- B. Coordinate and furnish anchorages, setting drawings, templates, and instructions for installation of expansion joint cover assemblies to be embedded in or anchored to concrete or to have recesses formed into edges of concrete slab for later placement and grouting-in of frames.
- C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary to secure expansion joint cover assemblies to in-place construction, including threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

- A. General:
 - 1. Install components and accessories in strict accordance with manufacturer's instructions coordinated with abutting material installation.
 - a. Perform all cutting, drilling, and fitting required to install expansion joint covers.
 - 2. Align work plumb and level flush with adjacent finished surfaces.
 - a. Set floor covers at elevations to be flush with adjacent finished floor materials, except as specifically indicated otherwise.
 - b. Locate wall, ceiling and soffit covers in continuous contact with adjacent surfaces.

3. Securely anchor cover assembly frames to substrate to prevent misalignment. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels.
 - a. Securely attach in place with required accessories. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches on center.
 4. Maintain continuity of expansion joints cover assemblies with a minimum number of end joints and align metal members mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames.
 5. Adhere flexible filler materials (as detailed and appropriate to installed product) to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- B. Where wall-to-wall expansion joint covers meet ceiling-to-ceiling expansion joint covers provide mitred joints at inside corners.
- 3.4 CLEANING
- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- 3.5 PROTECTION
- A. Do not permit traffic over unprotected floor joint control assemblies; cover floor joints with plywood where wheel traffic occurs.
- B. Provide removable strippable coating to protect finish surfaces. Do not remove strippable protective materials before all finish Work in adjacent areas is completed. Remove protective materials immediately prior to final inspection for Project Substantial Completion. When protective materials are removed, clean exposed metal surfaces to comply with manufacturer's instructions.
- 3.6 SCHEDULE
- A. Fire barrier system at floor construction: Fire barrier system tested in accordance with UL 2079 at full thermal maximum opening for required hourly rating equal to Watson Bowman Acme Corporation, model number "Wabo FlameGuard II HFG".
- B. Floor to floor conditions, 3 inch joint size equal to Watson Bowman Acme Corporation, model number "FNB-300", with clear anodized aluminum cover and base sized to accommodate abutting finish flooring thickness.
- C. Wall to wall conditions, 3 inch joint size equal to Watson Bowman Acme Corporation, model number "EWH-300", with clear anodized aluminum cover and base sized to accommodate abutting finish flooring thickness.
- D. Wall to ceiling conditions, 3 inch joint size, equal to Watson Bowman Acme Corporation, model number CWCA-300C, with clear anodized extruded aluminum and elastomeric seal.

- E. Ceiling to ceiling conditions, 3 inch joint size, equal to Watson Bowman Acme Corporation, model number "EWH-300"., with clear anodized extruded aluminum and elastomeric seal.

- F. General:
 - 1. Joint sizes as specified, except as otherwise indicated on Drawings.
 - 2. Expansion joints, 2 hour rated required at all fire resistant rated joints.

End of Section

Section 08 00 05
METAL WINDOWS TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.
1. Specification requirements for the Trade Contract "METAL WINDOWS" include all of the following listed Specification Sections: in their entirety:
 - a. Section 08 00 05 – METAL WINDOWS TRADE CONTRACT REQUIREMENTS.
 - b. Section 08 43 13 – ALUMINUM-FRAMED STOREFRONTS.
 - c. Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS
 - d. Section 08 51 13 – ALUMINUM WINDOWS.
 - e. Section 08 63 00 – METAL-FRAMED SKYLIGHTS.
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 08 00 05 – METAL WINDOWS TRADE CONTRACT REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:

2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
 1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.
 2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2,

FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.

3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 QUALITY ASSURANCE

- A. Company specializing in work described in the above listed individual specification sections with minimum 5 years documented experience.

1.5 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

1.6 INSTALLER'S WARRANTY

- A. In addition to other specified warranties, both in the Conditions of the Contract and in individual Sections of this Trade Contract, the Trade Contractor will be held responsible for the satisfactory performance of the all windows for a period of one year. The Trade Contractor shall provide a warranty which includes all products provided under this trade, including all windows, curtain wall, storefront, entrance doors, hardware, glass (including insulated units), glazing, anchorage and setting systems, sealing, flashing and other related components, as they relate to specified air, water, and structural integrity. All deficiencies in products provided under this Trade and related components which do not meet the specifications are to be corrected promptly at no expense to the Owner during the warranty period.

PART 2 - PRODUCTS

2.1 SINGLE SOURCE REQUIREMENT

- A. All aluminum windows, aluminum entrances and storefront assemblies provided for this project shall be products of a single manufacturer.
- B. All glass provided under the work of this Trade Contract shall be products of a single manufacturer.

2.2 SCAFFOLDS AND STAGING

- A. General: Metal Windows Trade Contractor shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work and all other Work requiring such equipment as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor.
 - 2. Metal Windows Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction

Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).

3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.3 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION (Not Used)

End of Section

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Section 08 00 08
GLASS AND GLAZING TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.
1. Specification requirements for the Trade Contract "GLASS AND GLAZING" include all of the following listed Specification Sections: in their entirety:
 - a. Section 08 00 05 – GLASS AND GLAZING TRADE CONTRACT REQUIREMENTS.
 - b. Section 08 80 00 – GLAZING.
 - c. Section 08 88 60 – FIRE-RATED GLAZING AND FRAMING SYSTEMS.
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 08 00 08 – GLASS AND GLAZING TRADE CONTRACT REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
 2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the

GLASS AND GLAZING TRADE CONTRACT REQUIREMENTS

Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.
 2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3,

P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.

3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 QUALITY ASSURANCE

- A. Company specializing in work described in the above listed individual specification Sections with minimum 5 years documented experience.

1.5 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Do not order or deliver any materials until all schedules and submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

- A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in the Construction Manager's GENERAL PROJECT REQUIREMENTS – APPLICABLE TO ALL TRADE AND NON-TRADE SUBCONTRACTORS and herein.
 - 1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of the Construction Manager's GENERAL PROJECT REQUIREMENTS – APPLICABLE TO ALL TRADE AND NON-TRADE SUBCONTRACTORS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor requiring such scaffolding.
 - 2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager.
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
 - 4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each workday to prohibit access to the scaffolding by unauthorized individuals.

2.2 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor.

PART 3 - EXECUTION (Not Used)

End of Section

Section 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish the following products to be installed under the designated Sections:
1. Flush UL-Labeled and non-labeled steel doors, complete with internal reinforcing, hardware cut-outs; and provided with glazing openings, where so indicated; installed by Section 06 20 00 - FINISH CARPENTRY.
 2. Hollow metal frames for doors, UL-Labeled and non-labeled, complete with internal reinforcing; installed under Section 06 10 00 - ROUGH CARPENTRY. Grout fill shall be provided under Section 04 20 00 – UNIT MASONRY.
 3. Hollow metal frames for fixed-glazed window conditions, complete with internal reinforcing installed by: Section 06 10 00 - ROUGH CARPENTRY.
 4. Glazing beads, loosely attached to hollow metal frames and doors, where so indicated, for removal and permanent installation during glazing operations; installed by: Section 08 80 00 - GLAZING.
 5. Mineral wool (fiber) insulation at all exterior hollow metal frames for doors; installed by Section 06 10 00 – ROUGH CARPENTRY.
 6. Butyl flashing onto all exterior hollow metal frames for doors; installed by Section 06 10 00 – ROUGH CARPENTRY.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.

- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 04 20 00 - UNIT MASONRY: Building-into masonry hollow metal door frames, placed and braced under Section 06 10 00 - ROUGH CARPENTRY.
- G. Section 06 10 00 - ROUGH CARPENTRY:
 - 1. Wood blocking, and nailers.
 - 2. Installation of hollow metal door frames.
 - 3. Placement and temporary bracing of hollow metal frames built-into masonry.
- H. Section 06 20 00 - FINISH CARPENTRY: Wood casing and trim; installation of doors and hardware.
- I. Section 07 92 00 - JOINT SEALERS.
- J. Section 08 14 16 - FLUSH WOOD DOORS: Furnishing wood and laminate clad doors to be installed in hollow metal frames.
- K. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware, and installation templates for hardware cut-outs and reinforcing.
- L. Section 08 51 13 – ALUMINUM WINDOWS: Furnishing and installing glass located in exterior doors and frames.
- M. Section 08 80 00 - GLAZING: Furnishing and installing glass located in interior doors and frames.
- N. Section 09 91 00 - PAINTING: Applied finish coatings.
- O. Division 26 – ELECTRICAL:
- P. Building-in of frame anchors to wall and partition construction: By trade responsible for wall and partition erection.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
 - 2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcing.
 - 3. ANSI A250.8 (formerly SDI 100) - Recommended Specifications for Standard Steel Doors and Frames.
 - 4. ASTM E 152 - Methods of Fire Tests of Door Assemblies.
 - 5. ASTM A 109 - Steel, Strip, Carbon, Cold Rolled.
 - 6. ASTM A 415 - Specification for Hot-Rolled Carbon Steel Sheets, Commercial.

7. ASTM A 568 - Steel, Carbon and High Strength Low Alloy Hot Rolled Strip, and Cold Rolled Sheet.
8. ASTM A 653 Structural Quality Grade 37 (A 653M), Steel Sheet, Zinc-Coated, (galvanized) by the Hot-Dip Process.
9. ASTM A 924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
10. ASTM A 1008 - Steel Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy with Improved Formability.
11. SDI 111 Series (111A-111F): Recommended Details, Steel Doors and Frames.
12. SDI 117-93: Manufacturing Tolerances for Standard Steel Doors and Frames.
13. NFPA publication 80 - Fire Doors and Windows.
14. NFPA publication 105 – Standard for the Installation of Smoke Door Assemblies.
15. UL publication 10B - Fire Tests of Door Assemblies.
16. UL 1784 – Air Leakage Tests of Door Assemblies.
17. All applicable federal, state and municipal codes, laws and regulations for exits.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, for doors, frames and shop applied finishes.
 2. Certification: Manufacturer's written certification stating that doors, frames, and all related items to be furnished hereunder, meet or exceed the requirements specified under this Section; that specified galvanized and shop priming has been performed; and that all UL fire-resistive requirements for the indicated Labels have been met.
 3. Shop drawings: A complete schedule of doors and frames, to be furnished hereunder, coordinated with the door and frame schedule contained in the Contract Drawings. Large scale details of each type door and frame construction, indicating all gages, cut-outs for glazing in doors, reinforcing, and anchorage.
 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General

Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 REGULATORY REQUIREMENTS

- A. Fire rated door construction shall conform to UL publication 10B.
- B. Install fire rated door assemblies in compliance with NFPA 80.
- C. Corridor doors shall be tested and listed per UL 1784.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing doors and frames.
- B. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.
- C. Do not fabricate doors or frames before receiving a copy of the approved hardware schedule, submitted by the hardware supplier, reviewed by the Contractor and accepted by the Architect. Verify that issued templates are coordinated with the approved schedule; immediately notify the Architect, in writing, of any conflicts.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Prior to shipping, identify each frame and door with a removable metal or plastic label which corresponds with door schedule identifying opening number and location.
- B. Deliver doors and frames boxed or crated to provide protection during transit and job storage.
- C. Inspect doors and frames upon delivery for damage. Minor damage may be repaired provided the refinished items are equal in respects to new work and acceptable to the Architect; otherwise remove and replace damaged items.

- D. Store doors and frames at the building site upright and under cover. Place the units on wood dunnage and cover in a manner that will prevent rust and damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Amweld Building Products, Inc., (A Division of Amweld International, LLC), Coppell TX.
 - 2. Ceco Door Products (A Division of Assa Abloy Group Company), Milan TN.
 - 3. Curries Company A Division of Assa Abloy Group Company), Mason City IA.
 - 4. Essex Industries, Inc. New Haven CT.
 - 5. Republic Doors and Frames, McKenzie TN.
 - 6. Steelcraft (A Division of Ingersoll-Rand Company), Cincinnati OH.
 - 7. Metal Products, Inc., Corbin, KY.
- B. Unless otherwise specifically accepted by Architect, all doors and frames shall be of one manufacturer.

2.2 DOORS

- A. General: Refer to the Drawings for design of doors, sizes, glazing cut-outs in doors, and details.
- B. Construction: Full flush commercial type, 1-3/4 inches thick, unless noted otherwise, meeting or exceeding the materials, gages, construction, and testing requirements of the referenced ANSI and SDI publications.
 - 1. Exterior Door Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene or polyurethane core (at non-rated doors only). Fabricate exterior doors with specified R-value when tested according to ASTM C1363.
 - a. Core construction:
 - 1) Manufacturer's standard expanded polystyrene complying with ASTM C 591
 - b. Thermal properties when tested in accordance with ASTM C 1363:
 - 1) R-value: 10.0 (polyurethane core).
 - 2) At all exterior doors, fabricate doors with specified R-value when tested according to ASTM C 1363.
 - 2. Interior Door Core Construction: Manufacturer's standard polystyrene, core.
 - a. Interior Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
- C. Interior Doors 1-3/4 inch thick (44.4 mm): ANSI 250.8, Level 2, Model 1 (Full Flush), ANSI A250.4 Physical Performance Level B, (Heavy Duty) having 18-gage, minimum 0.042 inch (1.0 mm) steel faces, with a minimum STC rating of 32.

1. Fire-rated doors: Modify specified construction to meet all construction requirements required for fire-resistive rating.
 - a. Affix appropriate UL, FM or Warnock Hersey labels to each rated door, indicating applicable rating.
 - D. Exterior Doors: ANSI 250.8, Level 3, Model 2 (Seamless), ANSI A250.4 Physical Performance Level B, (Extra Heavy Duty) having 16-gage, 0.058 inch thick (1.46 mm) galvanized steel faces.
 - E. Glazing stops: Rectangular channel sections, not less than 20 gage; pre-drilled and loosely attached within the glazing cut-outs with countersunk tamper-resistant stainless steel screws; sized to properly accommodate the designated thicknesses of glass and glazing materials; and external edges set flush with, or slightly behind, door face. Modify glazing stops for UL Label doors to conform with UL fire rating requirements.
 - F. Hardware reinforcing: Welded in place steel reinforcement, hot rolled pickled and oiled steel per ASTM A569, with the following minimum gages:
 1. Hinges, 8 gage, minimum 0.152 inch (3.8 mm) thick.
 2. Kick plates, 18 gage, minimum 0.042 inch (1.0 mm) thick.
 3. Closers, locks, and all other hardware: 10 gage, minimum 0.123 inch (3.1 mm) thick.
 4. Locations for reinforcing shall be determined from information and templates provided under Section 08 71 00 - DOOR HARDWARE.
 - G. Fabrication
 1. Fabricate exposed faces of door panels from cold-rolled steel only.
 2. Fabricate concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at manufacturer's option).
 3. Fabricate doors with hardware reinforcement welded in place.
 4. Attach fire rated label to each door unit.
 5. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.
- 2.3 HOLLOW METAL FRAMES
- A. General: Refer to the Drawings for various types of frames, sizes, and profiles, UL fire-resistive Label frames, and other characteristics of frames and related items.
 1. Frame type: Shop welded frames with mitered joints arc-welded, reinforced and ground smooth.
 - B. Materials for frames, reinforcement, anchors, anchor clips and related items: commercial grade cold-rolled steel conforming to ASTM A109 or commercial grade hot-rolled and pickled steel conforming to ASTM A415.
 1. Frame gage:
 - a. Interior frames: 16-gage, 0.053 inch thick (1.3 mm), except as otherwise required for specific U.L. Label.

- b. Exterior frames: 14-gage, 0.067 inch thick (1.7 mm), with a zinc coating supplied by the hot-dip process conforming to ASTM A653, Grade 37, with coating applied in accordance with A 924.
 2. Hinge, lock and strike reinforcement: 7 gage (4.4 mm) thick.
 3. Door closer reinforcement: 12 gage, minimum 0.093 inch (2.3 mm) thick.
 4. Floor clips: 16 gage (1.3 mm) thick.
 5. Splice plates or channels: same gage as door frame.
 6. Glazing stops: 16 gage, minimum 0.053 inch (1.3 mm) thick, except as otherwise required for specific U.L. Label.
 7. Mortar guards: 26 gage, minimum 0.016 inch (0.4 mm) thick.
 8. Butyl flashing at frames: Flexible self-sealing, self-healing, fully adhering composite flexible flashing, .8 mm (30 mils minimum.) of self-adhering butyl adhesive integrally bonded to a heavy foil facer. Membrane shall be interleaved with poly release paper until installed. Provide with manufacturer recommended surface conditioners, termination mastics and pre-formed corners.
 - a. Product:
 - 1) Carlisle Waterproofing, product: "Aluma-GRIP 701".
 - 2) Berry Plastics Corporation product: "Polyken 626-35 Foilastic".
 - 3) Tremco Commercial Sealants and Waterproofing, product: "ExoAir Foil Flashing".
 - b. Minimum performance characteristics:
 - 1) Carlisle Waterproofing product: Aluma-Grip 701 (basis of design).
- C. Frame construction:
 1. Fire-rated frame assemblies: Modify specified construction to meet all construction requirements required for fire-resistive rating.
 - a. Affix appropriate UL, FM or Warnock Hersey labels to each rated frame assembly, indicating applicable rating.
 2. Shop-fabricate frames as whole single units per door opening, except when frame size is too large to ship as a single unit. Oversized frames may be shipped in large sections as practicable for field assembly with concealed splice plates or channels.
 3. Frame corner construction: As specified in paragraph A, above.
 4. Reinforcements, stiffeners, and base angle clips: Welded to interior surfaces of frames to provide a stable base and so as to not interfere with installation of hardware.
 5. Provide mortar boxes, welded to frame, at back of hardware cut-outs where mortar or other materials may obstruct hardware operation.
 6. Appearance of finished frames: Strong, rigid, completely free from warp and buckle, with miters well-formed and in true alignment, and with surfaces smooth and free from defects of any kind.
 7. Silencer holes: Punch three holes in stop of strike jamb of door frames for application of silencers.
 8. Glazing beads: Carefully place to properly accommodate the various thicknesses of glass and glazing materials, and loosely-attach to frames with

flathead galvanized steel screws through pre-drilled holes having countersunk depressions.

- D. Anchorage:
1. Anchor clips for frames in metal stud partitions: 16-gage steel z-shaped clips, 1-1/2 inch upturned and downturned legs, or equivalent type standard with the manufacturer, contained within the frames, for screw attachment to metal studs under Section 09 22 16 - NON-STRUCTURAL METAL FRAMING.
 2. Anchor clips for frames in cold-formed metal framed exterior walls: 12-gage steel z-shaped clips, 1-1/2 inch upturned and downturned legs, or equivalent type standard with the manufacturer, contained within the frames, for screw attachment to metal studs under Section 05 40 00 - COLD-FORMED METAL FRAMING.
 3. Anchors for frames in masonry walls: Adjustable, T-shaped, positively engaging the retainers on both flanges of each jamb member, when placed. The stem of the anchors shall be 2 inches wide by 12 gage, minimum, corrugated or perforated for mortar bond, and extend 10 inches into the masonry, unless otherwise indicated.
 4. Anchors for fire-resistive rated frames: Conform to all UL requirements for the specific fire-resistive ratings.
 5. Typical frames: Provide not less than 3 anchors, clips, or bolts (as applicable), per jamb.
 - a. Frames exceeding 3 feet in width, and cross corridor frames: Provide not less than 4 anchors, clips, or bolts (as applicable), per jamb.

2.4 FABRICATION TOLERANCES

- A. Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

2.5 FACTORY FINISHING

- A. Preparation: Pressure-sand all surfaces of all doors, frames, accessory items, anchors, and related items, to remove blemishes and foreign matter and provide paint grip. Spot-fill imperfections with metallic filler, and sand smooth. Thoroughly clean the surfaces by applying hot or cold phosphate treatment standard with the manufacturer.
- B. Following cleaning apply one dip or spray coat of rust-inhibitive metallic oxide, zinc chromate, or synthetic resin primer to all surfaces, including those which will be concealed after erection. Bake, or oven dry, the primer at time and temperature recommended by the manufacturer for developing maximum hardness and resistance to abrasion.

PART 3 - EXECUTION

3.1 ERECTION AND INSTALLATION

- A. Installation of frames and doors, including all accessories and related items furnished hereunder, will be performed under Section 06 10 00 - ROUGH CARPENTRY, and Section 06 20 00 - FINISH CARPENTRY.

1. Section 06 10 00 - ROUGH CARPENTRY shall place frames in correct position within specified tolerances, and provide temporary bracing at locations where frames are indicated to be built-into masonry. Section 04 20 00 - UNIT MASONRY shall build and grout frames into masonry work.
- B. Final installation of loosely-attached glazing stops will be performed under Section 08 80 00 - GLAZING.

End of Section

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Section 08 12 16
ALUMINUM FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Non-labeled aluminum frames for interior toilet room doors at lobbies not included as part of Section 08 41 13 – ALUMINUM-FRAMED STOREFRONTS, complete with internal reinforcing, installed by Section 06 10 00 - ROUGH CARPENTRY.
 - 2. UL-Labeled aluminum frames for doors, complete with internal reinforcing, installed by Section 06 10 00 - ROUGH CARPENTRY.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, and nailers; installation of aluminum door frames.
- G. Section 06 20 00 - FINISH CARPENTRY: Installation of doors and hardware.
- H. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.

- I. Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES: Furnishing hollow metal doors and frames.
- J. Section 08 14 16 - FLUSH WOOD DOORS: Furnishing doors to be installed in aluminum frames.
- K. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware, and installation templates for hardware cutouts and reinforcing.
- L. Building-in of frame anchors to wall and partition construction: By trade responsible for wall and partition erection.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
 - 2. AAMA 2603 - Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum (as amended).
 - 3. AAMA 606.1 - Voluntary Guide Specification and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
 - 4. AAMA 608.1 - Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
 - 5. AAMA 611 – Voluntary Standards for Anodized Architectural Aluminum.
 - 6. ASCA 96 - Voluntary Specification for Performance of Organic Coatings on Architectural Aluminum Curtainwall, Extrusions and Miscellaneous Aluminum Components.
 - 7. All applicable federal, state and municipal codes, laws and regulations for exits.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 - 2. Shop drawings: A complete schedule of frames, to be furnished hereunder, coordinated with the door and frame schedule contained in the Contract Drawings. Large scale details of each type frame construction, indicating all gauges, reinforcing, anchorage, and cut-outs for glazing in doors.
 - 3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required

following initial Green Building Certification Institute (GBCI) review of LEED Application.

- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing doors and frames.
- B. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.
- C. Do not fabricate doors or frames before receiving a copy of the approved hardware schedule, submitted by the hardware supplier, reviewed by the Contractor and accepted by the Architect. Verify that issued templates are coordinated with the approved schedule; immediately notify the Architect, in writing, of any conflicts.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prior to shipping, identify each frame and door with a removable metal or plastic label which corresponds with door schedule identifying opening number and location.
- B. Deliver frames boxed or crated to provide protection during transit and job storage.
- C. Inspect frames upon delivery for damage. Minor damage may be repaired provided the refinished items are equal in respects to new work and acceptable to the Architect; otherwise remove and replace damaged items.
- D. Store frames at the building site upright and under cover. Place the units on wood dunnage and cover in a manner that will prevent rust and damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following or approved equal:
1. RACO Interior Products, Inc., Houston, TX.
 2. Western Integrated Materials, Inc., Long Beach, CA.
 3. Concept Walls, Houston, TX.

2.2 FRAMES

- A. Aluminum alloy, 6063-T5 alloy and temper (ASTM B221) extruded and fabricated to shapes as required for each application, for knockdown field assembly field.
- B. Thickness of Main Frame Members: nominal 0.062 inch thick. Increase to 0.130 at frame and hinge anchorage locations.
- C. Fasteners and Hardware: Aluminum, stainless steel, or other non corrosive materials compatible with aluminum and acceptable to frame manufacturer. Countersunk style. Exposed fasteners not permitted.
- D. Provide continuous nylon backed wool pile sound and light seal around perimeter of door stop.
- E. All frame members shall arrive at job site mortised, drilled and tapped for hinge and strike locations.
- F. Frame design must permit installation over pre-finished walls.
- G. Profile shall be 2 inches minimum, or custom casing as selected by Architect. 7/16 inch minimum wall standoff required.

2.3 FABRICATION TOLERANCES

- A. Maximum variation for frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

2.4 FACTORY FINISH

- A. Shop-applied, fully oven cured Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), NAAMM - Metal Finishes Manual, and the following:
1. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
 2. Finish Coating shall be manufactured as one of the following products:
 - a. Glidden Company; product "Visulure."
 - b. Morton International; product "Fluoroceram CL."
 - c. PPG Industries Inc.; product "Duranar XL."

- d. Valspar Corp., product: "Flurothane."
- 3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
- 4. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
- 5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
- 6. Finish Coat (Color Coat): Polyvinylidene flouride enamel averaging 0.70 to 0.80 mil dry film thickness.
- 7. Top Coat: Polyvinylidene flouride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
- 8. Color and Appearance: Provide two colors as selected by Architect from manufacturer's complete range of options, including colors designated by the coating manufacturer as "bright," "premium," "exotic," "polychromatic," "pearlescent," or "metallic". Colors shall be in configuration approved by the Architect and shall include a color for the storefront framing system and a color for the entrance doors.
 - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.
- B. Concealed Steel Items: Galvanized in accordance with ASTM A 386 to 2.0 ounces per square foot.
- C. Isolation coating to cementitious and dissimilar materials: Apply one coat of bituminous paint or other acceptable coating to concealed aluminum surfaces in contact with cementitious and dissimilar materials

PART 3 - EXECUTION

3.1 ERECTION AND INSTALLATION

- A. Installation of frames and doors, including all accessories and related items furnished hereunder, will be performed under Section 06 10 00 - ROUGH CARPENTRY, and Section 06 20 00 - FINISH CARPENTRY.
 - 1. Section 06 10 00 - ROUGH CARPENTRY shall place frames in correct position within specified tolerances.
- B. Final installation of loosely-attached glazing stops will be performed under Section 08 80 00 - GLAZING.

End of Section

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Section 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish the following products to be installed under the designated Sections:
 - 1. Flush solid core wood veneer and plastic laminate clad wood doors, complete with necessary blocking, hardware cut-outs; and provided with openings for glazing and louvers, where so indicated, for installation under: Section 06 20 00 - FINISH CARPENTRY.
 - 2. Glazing beads, loosely attached to glazing cutouts in doors for removal and permanent installation under: Section 08 80 00 - GLAZING.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, and nailers; installation of steel door frames.
- G. Section 06 20 00 - FINISH CARPENTRY: Wood thresholds, frames, casing and trim; installation of doors and hardware.
- H. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Hollow metal frames scheduled to receive wood doors.

- I. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware, and installation templates for hardware cut-outs.
- J. Section 08 80 00 - GLAZING: Installation of glazing in doors.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
 - 2. ANSI A 208.1 - Wood Particleboard.
 - 3. ASTM E 152 - Methods of Fire Tests of Door Assemblies.
 - 4. ASTM D 523 - Specular Gloss.
 - 5. ASTM D 5456 –Evaluation of Structural Composite Lumber Products..
 - 6. FSC (Forest Stewardship Council): “FSC Certification Program”
 - 7. NFPA publication 80 - Fire Doors and Windows.
 - 8. WDMA Industry Standard IS 1A-13.
 - 9. UL 10B - Fire Tests of Door Assemblies.
 - 10. UL 10C – Positive Pressure Fire Door Test Method.
 - 11. Warnock-Hersey - Certification Listings for fire doors.
 - 12. All applicable federal, state and municipal codes, laws and regulations for exits.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Fabricator’s product data sheets, specifications, and performance data.
 - 2. Certification:
 - a. General: Fabricator’s written certification stating that doors, meet or exceed the requirements specified under this Section; that specified shop finishing has been performed; and that all fire-resistive requirements for the indicated Labels have been met.
 - b. Provide signed certification by agent of door manufacturer stating that machining, glazing and finishing of doors shall be performed by only by the manufacturer in its facilities.
 - 3. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 - a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards.
 - 1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor’s chain of custody number

and identify each chain of custody certified product on a line-item basis. A "vendor" is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.

- b. Composite Wood and Agrifiber Products: Include certification indicating compliance with the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda for all composite wood and agrifiber products.
4. Door schedule: All doors specified under this Section, coordinated with the schedule contained in the Contract Drawings.
 - a. Indicate doors to be factory finished and finish requirements.
 - b. Indicate fire protection ratings for fire rated doors.
 5. Shop drawings: Elevations, and large scale sections and details of door construction, indicating profiles, core construction, joinery, edges, and cut-outs for hardware and glazing.
 - a. Indicate dimensions and locations of mortises and holes for hardware.
 - b. Indicate dimensions and locations of cutouts.
 - c. Indicate requirements for veneer matching.
 6. Selection samples: Plastic laminate sample chain.
 7. Verification samples:
 - a. Corner section of specified flush type door, showing core construction and joinery.
 - b. For transparent finishes: submit two 8 by 10 inch mounted finished samples of each specie of veneer specified.
 - c. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.
 - d. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.
 8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 –

2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.

- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.
- g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 QUALITY ASSURANCE

- A. All materials and workmanship shall conform in all respects to the specified grades of the Window and Door Manufacturer's Association (WDMA) Industry Standard IS 1A-13, except as modified herein.
- B. Sustainability Standards Certifications:
 - 1. Chain of Custody wood doors: All wood products furnished under this Specification Section shall be "FSC certified" according to the rules of the Forest Stewardship Council (FSC).
 - a. FSC Certification includes the following certification bodies of forests and forest products:
 - 1) Certification Systems.
 - 2) SmartWood.
 - 3) SGS Qualifor.
 - 4) Soil Association.
 - b. Wood doors lacking acceptable documentation for Chain of Custody, will be rejected and their removal required.

1.6 REGULATORY REQUIREMENTS

- A. Fire rated door construction shall conform to UL 10C.
- B. Install doors in compliance with NFPA publication 80.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for furnishing hardware and installing wood doors.
- B. Ensure that the work performed hereunder is coordinated with issued templates authorized by the hardware supplier.

- C. Do not fabricate doors before receiving a copy of the approved hardware schedule, submitted by the hardware supplier, reviewed by the Contractor and approved by the Architect. Verify that issued templates are coordinated with the approved schedule; immediately notify the Architect, in writing, of any conflicts.

1.8 DELIVERY, STORAGE AND HANDLING

- A. The Contractor is responsible to make certain that wood doors are not delivered until the building and storage areas are sufficiently dry so that the doors will not be damaged by excessive changes in ambient humidity and relative moisture content.
- B. Deliver wood doors in resilient non-staining moistureproof packaging, provide protection during transit and job storage. Clearly identify doors with door opening number, matching those indicated on the approved Door Schedule.
- C. Inspect doors upon delivery for damage. Minor damage may be repaired provided the refinished items are equal in respects to new work and acceptable to the Architect; otherwise remove and replace damaged items.
- D. Store doors flat on a level surface, in protected, elevated, dry areas; protect from exposure from all sources of light and moisture. When required to maintain manufacturer's warranty, seal top and bottom edges if stored more than one week. Break packaging seal on-site to permit ventilation.

1.9 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.10 WARRANTY

- A. Provide the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranties shall include delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction, all as defined by AWI Quality Standards.
 - 1. Warranty length:
 - a. Interior doors: Manufacturer's lifetime warranty.
 - 2. Warranty coverage shall include all labor and material costs of delivery, re-hanging, re-finishing, glass and glazing to produce a complete installation of replaced or repaired doors.

PART 2 - PRODUCTS

2.1 FLUSH FACED DOORS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Algoma Hardwoods, Inc., Algoma WI.
 - 2. Marshfield DoorSystems™, Inc., Marshfield WI.
 - 3. Eggers Industries, Architectural Door Division, Two Rivers WI.
 - 4. Lambton Doors, Lambton Quebec Canada.

5. VT Industries Inc., Holstein IA.
 - B. Sustainable Forest Certification: All doors shall be "Chain-of-Custody" certified as FSC Certified.
 - C. General requirements: Conform to the requirements set forth in the designated Sections of the (WDMA) Industry Standard IS 1-A-97, and the applicable requirements of U.S. Commercial Standard CS 171, as amended. Refer to the Drawings for sizes, locations of each type door, glazing cutouts in doors, and other characteristics of doors to be furnished hereunder.
 1. Door Grade: Premium.
 2. Door Facing:
 - a. Face veneer: WDMA Industry Standard, "A" Grade veneer minimum 1/50 inch (0.6 mm) thick, mechanically splice Select White Maple (*Acer saccharum*) {sapwood}, Plain Sliced, Grade A with book matched grain, No heartwood will be accepted.
 - 1) Matching of adjacent pieces of veneer: Slip matched.
 - 2) Panel face assembly: Center Balanced.
 - b. Face veneer: Decorative Laminate Facing, NEMA LD-3 General Purpose type laminate, 0.050 inch (1.3 mm) thick in color selected by Architect from full range available.
 3. All doors PC-5 ply with edges matching face.
 4. Acoustical ratings:
 - a. Classroom to classroom (communicating door): G-30 rating.
 - b. Classroom to corridor: G-30 rating.
 - c. Entry doors to all music rooms: G-40 rating.
 - d. Entry doors to auditorium/stage: G-40 rating.
- 2.2 FIRE-RESISTANCE RATED 45, 60 AND 90 MINUTE LABEL DOORS
- A. General Construction: WDMA Industry Standard I.S. 1-A-97, S-21 Veneer, Fire Rated Mineral Core, Premium Grade Door.
 1. Door thickness: 1-3/4 inches, unless indicated otherwise.
 2. WDMA Specification Descriptions.
 - a. 90 minute "B" label doors: Type "FD-90 MIN-5".
 - b. 60 minute label doors: Type "FD-60 MIN-5".
 - c. 45 minute "C" label doors: Type "FD-45 MIN-5".
 - B. Door facing: As specified herein above under Article – "Flush Faced Doors".
 - C. Core construction:
 1. Core: Non-combustible asbestos free, mineral composite with a minimum of 28 pounds per cubic foot density complying with ASTM C303 having 10 percent maximum absorption by weight with core in equilibrium at 90 percent relative humidity and 70 degrees Fahrenheit.
 2. Stiles: multiple-ply stiles with 1/4 inch solid hardwood outer ply matching face veneers for species and color.
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3. Top and bottom rails: Maple, birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements.
4. Blocking:
 - a. For doors scheduled to receive screw-mounted surface closers, provide solid wood blocking.
 - b. For doors scheduled to receive surface mounted fire exit devices or vertical rods, provide top, intermediate and bottom rail blocking for screw mounting.
 - c. Provide additional blocking for all other surface mounted hardware.
- D. Adhesives: Type 1 (waterproof) for both face and core assembly.
- E. Accessories: For all fire-rated doors installed in pairs with both leaves active, provide 20-gage formed steel edges, without astragal, wrapped with veneer matching faces of doors.

2.3 NON-RATED SOLID-CORE DOORS

- A. General Construction: WDMA Industry Standard I.S. 1-A-97, S-9 Veneer, Particleboard Core Bonded, Premium Grade Door.
 1. WDMA Specification Description: "PC-5".
 2. Door thickness: 1-3/4 inches, unless indicated otherwise.
- B. Door facing: As specified herein above under Article – "Flush Faced Doors".
- C. Core construction:
 1. Core: Particleboard complying with ANSI A208.1 Type 1, Grade 1-LD-2 having a density of 33 pounds per cubic foot.
 - a. Provide only formaldehyde free particleboard, equal to Rodman Industries, Oconomowoc, WI. Furnish certification of formaldehyde free products.
 2. Stiles: Laminated strand lumber or hardwood mill option for inner ply of styles, continuously bonded to core with adhesives and abrasively planed before veneering, minimum of 1-3/8 inches after trimming, with 1/16 inch solid hardwood outer ply matching face veneer.
 3. Top and bottom rails: Maple, Birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements, minimum 1-1/8 inch width.
- D. Adhesives: Type 1 (waterproof) for both face and core assembly.

2.4 GLAZING BEADS

- A. Glazing beads 45, 60 and 90 minute fire rated doors, wood veneered bead:
 1. Algoma's style number W-9, labeled, with 1/2 inch sight line.
 2. Eggers #100 style.
 3. Marshfield DoorSystems veneer clad light bead.
 4. V-T type VT1F.

- B. Glazing beads for 20 minute fire rated and non-fire rated doors:
 - 1. Algoma's style number W-4 wood bead with 3/8 inch sight line.
 - 2. Eggers style number 100, 5/8 inch sight line.
 - 3. Marshfield DoorSystems style number W-6, 3/8 inch sight line.

2.5 FABRICATION

- A. Fabricate doors in accordance with specified manufacturer's requirements. Fabricated rated doors in compliance with WHI, or UL requirements as appropriate.
- B. Laminate door facing, cross banding and assembled core in a hot press.
- C. Bond stiles and rails to cores, sand for uniform thickness. Factory sand assembled door leaf.
- D. Factory-machine doors to receive hardware from templates furnished under Section 08 71 00 - DOOR HARDWARE. Do not machine for surface hardware.
 - 1. Provide inner blocks at lock edge and top of door for closer hardware reinforcement.
 - 2. Cut and configure door edges to receive scheduled gasketing.
- E. Factory fabricate doors for undercut where scheduled.
- F. Factory cut all louver and glazed openings as scheduled. Field cutting of openings is prohibited.
- G. Fabrication tolerances: Maximum diagonal distortion (warp): 1/4 inch (6 mm) measured with straight edge from corner to corner over a maximum 42 by 84 inch surface area.
- H. Drill all pilot holes for lock fronts and butt hinges at the factory.

2.6 FACTORY FINISHING

- A. General: Factory finish to be to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations.
- B. Transparent finish: AWI Premium Grade Factory Finish System 9, having water based stain and ultraviolet (UV) cured polyurethane sealer and topcoat, with a satin sheen of 31° to 35° gloss units per ASTM D523.
 - 1. Finish system shall include the following:
 - a. Finish sanding.
 - b. Stain application.
 - c. Stain curing.
 - d. Sealer application - first coat.
 - e. Sealer gel cure.
 - f. Sealer application - second coat.
 - g. Sealer gel cure
 - h. Sealer application - third coat

- i. Sealer full cure
 - j. Sealer sanding
 - k. Topcoat application - first coat
 - l. Topcoat application - second coat
 - m. Topcoat full cure
- C. Seal top and bottom edges of all doors at the factory.
- 1. Seal full perimeter of all field cut-outs.

2.7 ACCESSORIES

- A. Letter Drop Box at Door B136 (SPED Office): Basis of design "WSR-162 Protex Through-The-Door Letter Drop Box" or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation of wood doors, including all accessories and related items furnished hereunder, will be performed under Section 06 20 00 - FINISH CARPENTRY.
- B. Final installation of loosely-attached glazing stops will be performed under Section 08 80 00 - GLAZING.

3.2 TOUCH-UP FINISHES

- A. Field touch-up of doors, scheduled for transparent finishes, will be performed by door installer. Touch-up includes refinishing surfaces resulting from fitting, or job inflicted scratches and marks.

End of Section

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Section 08 31 00
ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Fire resistive rated and non-rated access panels and frames, as specified under this Section, furnished by Sections requiring the same and installed under the following Sections:
 - 1. Section 04 20 00 – UNIT MASONRY: Installation of access panels into masonry assemblies.
 - 2. Section 09 29 00 - GYPSUM BOARD: Installation of access panels into drywall assemblies.
 - 3. Section 09 30 13 - CERAMIC TILING: Installation of access panels into tiled walls.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 04 20 00 – UNIT MASONRY: Installation of access panels into masonry assemblies.
- G. Section 09 29 00 - GYPSUM BOARD: Installation of access panels into drywall assemblies.

- H. Section 09 30 13 - CERAMIC TILING: Installation of access panels into tiled walls.
- I. Division 21 - FIRE SUPPRESSION: Furnishing access panels required for fire protection systems.
- J. Division 22 - PLUMBING: Furnishing access panels required for plumbing systems.
- K. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Furnishing access panels required for heating/cooling systems.
- L. Division 26 - ELECTRICAL: Furnishing access panels required for electrical systems.

1.3 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Product Data: Manufacturer's product data sheets, specifications and installation instructions.
 - 2. Schedule: Submit Schedule of all access panels to be furnished hereunder, indicating locations for each size and type of access door.
 - a. The Contractor is responsible to ensure that all of the types/styles of panels and frames specified herein can be furnished by the manufacturer submitted.
 - b. Prior to submitting schedule, coordinate with the work of Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATING AND AIR CONDITIONING and Division 26 - ELECTRICAL and meet with the Architect to determine exact quantities and locations required for the installation of access panels.
 - 3. Shop drawings: Large scale details of access doors, indicating all sizes, gages and thickness; provide complete installation details, coordinated to the specific receiving conditions.
 - 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver access doors to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Store access door units inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Acudor Products Inc., Cedar Grove, NJ
 - 2. Cesco Products, North Brooklyn Park MN.
 - 3. J.L. Industries, Bloomington MN.
 - 4. Karp Associates Inc., Maspeth NY.
 - 5. Miami-Carey Corp., Monroe OH.
 - 6. Nystrom Products Company, Minneapolis MN.
 - 7. Milcor, Inc. Lima OH.
 - 8. Larson Manufacturing Co., Brookings SD.
 - 9. Williams Brothers Corporation of America, Front Royal, VA.
- B. Single Source: All work of this Section shall be produced by a single manufacturer, unless otherwise approved by the Architect.

2.2 ACCESS PANELS - GENERAL

- A. Access panels scheduled for placement in masonry: Furnish with masonry anchors attached to unit frames at factory.
- B. Access panels in kitchen areas shall be all stainless steel construction.

2.3 ACCESS PANELS - FOR FIRE RESISTANCE RATED CONSTRUCTION

- A. For fire-resistance rated wall and ceiling surfaces: Standard flush panel door meeting the following requirements:
 - 1. Panel and frame rating: UL "B" label for 90 minutes.
 - 2. Frame type:
 - a. For ceramic tile walls: 16 gage Type 304 stainless steel flanged frame, with flange exposed to view 1 inch or less, equal to:
 - 1) Acudor FW-5050 series
 - 2) Karp KRP-150FR series.
 - 3) Nystrom IT series.
 - 4) Williams WB-FRSS Regular series.

- b. For masonry walls: 16 gage galvanized bonderized steel flanged frame, with flange exposed to view 1 inch or less.
 - 1) Acudor FW-5050 series
 - 2) Karp KRP-150FR series.
 - 3) Nystrom IT series.
 - 4) Williams WB-FR series.
- c. For gypsum board walls and ceilings: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
 - 1) Acudor FW-5050DW
 - 2) Karp KRP-350FR series.
 - 3) Nystrom IW series.
 - 4) Williams WB-FR series.
- 3. Door: Insulated Flush panel door as follows:
 - a. Typical wall types : Flush door, Sandwich construction with 2 inch thick mineral wool fiber insulation between two layers of 20 gage galvanized bonderized steel.
 - b. For ceramic tile walls only: Flush door, Sandwich construction with 2 inch thick mineral wool fiber insulation between two layers of 20 gage Type 304 stainless steel.
- 4. Hinge: Flush continuous piano hinge with stainless steel pin.
- 5. Closer: Spring closer.
- 6. Latch: Flush cam latch, operated by Allen or Torx head screwdriver.

2.4 ACCESS PANELS - FOR NON- RATED CONSTRUCTION

- A. For non-rated wall and ceiling surfaces: Flush panel door type meeting the following requirements:
 - 1. Frame type:
 - a. For tiled walls: 16 gage Type 304 stainless steel flanged frame, with flange exposed to view 1 inch or less, equal to:
 - 1) Acudor UF-5000 series.
 - 2) Karp DSC-214SM series.
 - 3) Nystrom NT series.
 - 4) Williams WB-GP series.
 - b. For masonry walls: 16 gage galvanized bonderized steel flanged frame, with flange exposed to view 1 inch or less.
 - 1) Acudor UF-5000 series.
 - 2) Karp DSC-214SM series.
 - 3) Nystrom NT series.
 - 4) Williams WB-GP series.
 - c. For gypsum board walls and ceilings: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
 - 1) Acudor DW-5040 series.
 - 2) Karp KDW series.
 - 3) Nystrom NW series.
 - 4) Williams WB-PL series.

2. Door: Flush panel door as follows:
 - a. Typical all wall types, except tile: 14 gage galvanized bonderized steel.
 - b. For tiled walls: 14 gage type 304 stainless steel.
3. Hinge:
 - a. Typical: Concealed spring hinge enabling door to open 175 degrees and permit removal of door from frame.
 - b. Panels greater than 24 by 36 inches: Flush continuous piano hinge with stainless steel pin.
4. Latch: Flush cam latch, operated by Allen or Torx head screwdriver.

2.5 FACTORY FINISHING

- A. Panel assemblies fabricated from stainless steel: N°. 4 satin finish.
- B. Panel assemblies fabricated from galvanized bonderized steel: Baked on rust inhibitive gray primer finish.
- C. Panel assemblies fabricated from cold rolled steel: Phosphate dipped with baked on rust inhibitive gray primer finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that prepared openings are ready to receive the work of this Section and opening dimensions are as indicated on the shop drawings. Verify that all blocking is set in place and secure.
- B. Beginning of installation means acceptance of project conditions.

3.2 INSTALLATION

- A. Install access panels in accordance with manufacturer's instructions and direction from authorities having jurisdiction. Install miscellaneous specialties absolutely level and in true line, with units securely anchored to the surrounding construction.
- B. Test each door and latching device, and make adjustments required to ensure a bind-free operation and proper latching.

End of Section

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Section 08 33 13
COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install electrically operated stainless steel coiling counter shutters, complete with guides, operating hardware and mechanisms, coil housings, and all related items.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 05 40 00 – COLD-FORMED METAL FRAMING: Metal framing for headers and door supports.
- G. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.
- H. Section 06 20 00 - FINISH CARPENTRY: Installation of cylinder locks.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets and specifications.

2. Manufacturer's installation instructions. Indicate installation sequence and procedures, adjustment and alignment procedures and lubrication instructions.
 3. Maintenance Data: Lubrication requirements and frequency, periodic adjustments required.
 4. Shop drawings: Fully-dimensioned, large scale details of each type door and grille construction, tracks, guides, counterbalancing and operating mechanisms, hood enclosures, and related items; with complete installation details reflecting actual site conditions.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- B. Submit manufacturer's standard warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

PART 2 - PRODUCTS

2.1 COILING COUNTER DOOR (SHUTTER)

- A. Coiling counter shutter: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Overhead Door Company, Lewisville, TX, product "Model 651".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Overhead Door Company, Lewisville, TX.
 2. Raynor Garage Doors, Dixon IL.
 3. Atlas Door Corporation, Edison, NJ.
 4. Cornell Iron Works, Inc., Mountaintop, PA.
 5. Kinnear Inc., Columbus OH.
- C. Curtain:
 1. Slats: Roll-formed interlocking flat-faced extruded 22 gage stainless steel sections, 1-1/2 inches high, 1/2 inch deep.

- a. Endlocks rived to ends of alternate slats.
- 2. Bottom slat: Stainless steel angle minimum 1-3/4 by 1-3/4 inch by 12 gage. Provide extruded dual durometer polyvinyl chloride astragal.
- D. Counterbalance: Oil tempered helical torsion springs, housed in structural steel pipe barrel. Deflection of pipe under full load shall not exceed 0.03 inches per foot of span. Fit end of barrel assembly with plug disc to facilitate access to counterbalance assembly.
- E. Brackets: Minimum 16 gage hot-dipped formed galvanized steel, for supporting barrel, counterbalance mechanism, and hood, with a high factor of safety.
- F. Hood: Rectangular, formed 24 gage stainless steel.
- G. Guides: Continuous, vertical mounted Type 304 stainless steel. Provide guides with wool pile strip inserts on both sides of curtain to seal against interior and exterior faces of curtain. Attach to jambs with fasteners spaced not more than 12 inches apart.
- H. Locks: Slide bolt lock, internally located within bottom slat with interior cylinder designed to accommodate cylinders provided by Section 08 71 00 – DOOR HARDWARE. Provide safety interlock switch to disengage power when door is in locked position.
- I. Electric operation:
 - 1. Type: Jackshaft with manual chain hoist.
 - 2. Motor: Continuous 1/2 HP.
 - 3. Electrical requirements: 230 volt, single phase.
 - 4. Duty cycle: 30 cycles/hour.
 - 5. Control wiring: Motor starter 24 volt control with provisions for connection of safety edge to reverse and external radio control hook-up. Three button momentary contact "open-close-stop".
 - 6. Model Number: Raynor, "Series PHS" or approved equal.
- J. Finish:
 - 1. Stainless steel components: No. 4 satin with non-directional brushed finish.
 - 2. Steel parts: Factory primed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Perform installation in accordance with the approved shop drawings and the recommendations of the manufacturer. Set entire assembly including doors, guides, and hardware, plumb and true to line, to assure smooth operation.
 - 1. Maximum variation from plumb or level: 1/16 inch.
 - 2. Maximum variation in longitudinal or diagonal warp: 1/8 inch per 10 foot straight edge.

- B. Adjust counter shutter, locking hardware and operating assembly as required to ensure a smooth operation without binding.

3.2 CLEANING

- A. Remove all protective films and coverings from assembly components, and clean doors and guides. Remove tools, equipment and all rubbish and debris from the work area, caused by the work of this Section; leave area in broom-clean condition.

End of Section

Section 08 33 23
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install coiling door assemblies, complete with all related items, including but limited to:
 - 1. Insulated galvanized steel slat door(s).
 - 2. Tracks.
 - 3. Clip angles.
 - 4. Guides.
 - 5. Electrical operation hardware and mechanisms.
 - 6. Coil housing.
 - 7. Operating control station.
 - 8. Weather seals.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED SECTIONS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 04 20 00 - UNIT MASONRY: Concrete block wall and brick veneer.
- G. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Steel framing.

- H. Section 05 50 00 - METAL FABRICATIONS: Galvanized steel framing for door frame and guard and door header.
- I. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking for door opening.
- J. Section 06 20 00 - FINISH CARPENTRY: Installation of cylinder locks in coiling door[s].
- K. Section 07 92 00 - JOINT SEALANTS: Perimeter sealant and backup materials.
- L. Section 08 71 00 - DOOR HARDWARE: Furnishing cylinders for coiling door[s].
- M. Division 26 - ELECTRICAL:
 - 1. Conduit from electric circuit to door operator and from door operator to control station.
 - 2. Electrical power wiring and conduit from the building power supply to the motors, and from the motors to the operating control stations.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI/UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.
 - 2. NEMA 250 - Enclosures for Electrical Equipment.
 - 3. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
 - 4. NEMA MG1 - Motors and Generators.

1.4 SYSTEM DESCRIPTION

- A. Design coiling door assembly to withstand wind/suction load of 25 psf, without undue deflection or damage to door or assembly.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, and performance data.
 - 2. Manufacturer's installation instructions. Indicate installation sequence and procedures, adjustment and alignment procedures and lubrication instructions.
 - 3. Maintenance Data: Lubrication requirements and frequency, periodic adjustments required.
 - 4. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.

5. Shop drawings: Fully-dimensioned, large scale details of each type door construction, tracks, guides, counterbalancing and operating mechanisms, electrical characteristics, hood enclosures, and related items; with complete installation details reflecting actual site conditions for each location.
6. Verification sample:
 - a. Samples indicating Manufacturer's clear anodized finish for approval by Architect.
7. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.6 QUALIFICATIONS

- A. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.8 WARRANTY

- A. Provide 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include materials and workmanship, satisfactory operation, and contain any limitations of items specified herein.

1.9 MAINTENANCE

- A. Provide Installers maintenance contract under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, commencing on Date of Substantial Completion and extending for a period of one year. Maintenance contract shall include the following:
 1. Emergency callback service for the doors.
 2. Annual examinations of the installation during regular working hours by trained employees of the door manufacturer.

3. All necessary adjusting, greasing, and oiling.
 4. Cleaning supplies and parts necessary to keep the equipment in proper operation, except any parts needed due to misuse, accident, or neglect caused by other trades.
- B. Repair work shall be carried out only by the door installer's personnel, using only standard parts furnished by the door manufacturer. Maintenance shall be carried out directly by the installer and shall not be assigned or transferred to any agent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Overhead coiling door: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Overhead Door Company, Lewisville, TX, product: "Model 625".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Overhead Door Company, Lewisville, TX.
 2. Cornell Iron Works, Inc., Mountaintop PA.
 3. Raynor Garage Doors, Dixon IL.

2.2 SYSTEM DESCRIPTION

- A. Door Operation: Design door assembly, including operator, to operate for not less than 50,000 cycles.
- B. Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with Massachusetts State Building code as measured in accordance with ASTM E 330, without undue deflection or damage to door or assembly
- C. Maximum air leakage per foot of door perimeter (sill, jamb and header) shall not exceed 0.81 CFM (6.36 cm²/min) at 25 MPH (402 KM/hr). No air leakage shall be detected between section joints when tested in accordance with ASTM E-283.

2.3 INSULATED COILING DOOR COMPONENTS

- A. Curtain:
1. Steel slats: Interlocking flat-faced insulated slats, sandwich slat construction with:
 - a. Minimum 22 gage of ANSI/ASTM A526 steel, sandwich construction, nominal 3 inches high by a minimum of 15/16 inch thick and galvanized to a minimum of 1.25 oz/sf coating in accordance with ASTM A525.
 - b. Insulated core of foamed in place urethane insulation, without any voids. Insulation to provide curtain assembly with a minimum "R" value of 10.9 calculated per ASHRAE standards.
 2. Endlocks: Continuous molded, high strength nylon riveted to both ends of each slat.

3. Bottom slat: Fitted with angles to provide reinforcement and positive contact with floor in closed position, equipped with compressible vinyl coated safety/weather edge.
 - B. Counterbalance: Oil tempered helical torsion springs, housed in steel pipe barrel, supporting the curtain with a deflection not exceeding 0.03 inch per foot of width, equipped with ball or roller bearings, and adjustable by means of external tension wheel.
 - C. Brackets: Minimum 3/16-inch thick steel plate, for supporting barrel, counterbalance mechanism, and hood, with a high factor of safety.
 - D. Hood: 24 gage, minimum, galvanized steel, beaded, and flanged to prevent deflection. Equip hood with neoprene/rayon air baffle between top of hood and curtain.
 - E. Guides: Continuous, vertical mounted galvanized, formed from 3/16 inch thick angles. Provide guides with vinyl weather strips to seal against interior and exterior faces of curtain. Provide windlock bars per manufacturer's standards.
 - F. Locks: Pin tumble single unit mechanism, installed on each jamb, and designed to accommodate cylinders provided by Section 08 71 00 - DOOR HARDWARE.
 - G. Door Operation:
 1. Motor: 1/2 HP 115/230 VAC single phase, totally enclosed, instant reversing, with electric interlock to prevent operation when lock bolts are engaged in guides.
 2. Reversing contact: Heavy-duty, electrically and mechanically interlocked.
 3. Limit switches: Adjustable rotary type, synchronized with door.
 4. Control circuit: 24 VAC, Class 2.
 5. Reduction: Worm gear running in oil bath, primary; chain and sprocket, secondary.
 6. Heavy-duty gearhead operator, equal to "RH" by Overhead Door.
 7. Clutch: Adjustable friction type.
 8. Brake: Solenoid actuated drum type.
 9. Mounting: Side (bench) mounted.
 10. Control stations: 3-button keyed.
- 2.4 ACCESSORIES
- A. Brackets and support clips: Provide guide rail, counterbalance shaft assembly, and hood supports as required for a complete assembly, finish of supports to match products being supported.
- 2.5 FABRICATION
- A. Do not fabricate doors until all specified submittals have been submitted to, and approved by, the Architect.

2.6 FINISH

- A. Galvanized Steel: Phosphate treatment followed by baked-on polyester powder coat, minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.
 - 1. Color as selected by Architect from manufacturer's standard color range, minimum 32 colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as indicated on reviewed and approved shop drawings.
- B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

- A. Perform installation of all items furnished hereunder, except as otherwise specified, in accordance with the approved shop drawings and the recommendations of the manufacturer.
- B. Set entire assembly including doors, guides, and hardware, plumb and true to line, to assure smooth operation. Brace guides internally to provide a completely rigid installation. Attach jambs with not less than 3/8 inch steel bolts spaced not more than 30 inches apart.
- C. Coordinate installation of electrical service for overhead coiling doors with Division 26 - ELECTRICAL. Complete power and control wiring from disconnect to unit components.
- D. Coordinate installation of sealant and backing materials at frame perimeter of coiling overhead door as specified in Section 07 92 00 - JOINT SEALANTS.

3.3 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work. Maximum variation from plumb or level: 1/16 inch. Maximum variation in longitudinal or diagonal warp: 1/8 inch per 10 foot straight edge.

3.4 ADJUSTING

- A. Adjust doors, hardware and operating assembly as required to ensure a smooth operation without binding.

3.5 CLEANING

- A. Remove all protective films and coverings from assembly components, and clean doors and guides. Remove tools, equipment and all rubbish and debris from the work area, caused by the work of this Section; leave area in broom-clean condition.

End of Section

Section 08 33 26
OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install manually operated rolling grille assembly (at B171 Security Office) and electrically-operated rolling grille assemblies, complete with tracks, clip angles, guides, operating hardware and mechanisms, coil housing, operating control station, and all related items, at indicated interior locations.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 04 20 00 - UNIT MASONRY: Concrete block wall and brick veneer.
- G. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Steel framing.
- H. Section 05 50 00 - METAL FABRICATIONS: Galvanized steel framing for door frame and guard and door header.
- I. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking for door opening.
- J. Section 06 20 00 - FINISH CARPENTRY: Installation of cylinder locks in coiling door[s].

- K. Section 07 92 00 - JOINT SEALANTS: Perimeter sealant and backup materials.
- L. Section 08 71 00 - DOOR HARDWARE: Furnishing cylinders for coiling door[s].
- M. Division 26 - ELECTRICAL:
 - 1. Conduit from electric circuit to door operator and from door operator to control station.
 - 2. Electrical power wiring and conduit from the building power supply to the motors, and from the motors to the operating control stations.
 - 3. Card access control.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI/UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.
 - 2. NEMA 250 - Enclosures for Electrical Equipment.
 - 3. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
 - 4. NEMA MG1 - Motors and Generators.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, and performance data.
 - 2. Manufacturer's installation instructions. Indicate installation sequence and procedures, adjustment and alignment procedures and lubrication instructions.
 - 3. Maintenance Data: Lubrication requirements and frequency, periodic adjustments required.
 - 4. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 - 5. Shop drawings: Fully-dimensioned, large scale details, tracks, guides, counterbalancing and operating mechanisms, electrical characteristics, hood enclosures, and related items; with complete installation details reflecting actual site conditions for each location.
 - 6. Selection samples:
 - a. Sample card indicating Manufacturer's full range of finishes available for selection by Architect.
 - b. Provide additional samples as requested by Architect for initial selection of colors and finishes.
 - 7. Verification samples:

- a. 12 x 12 inch samples of grille illustrating material and finish.
- b. 12 inch long samples of bottom bar.
8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.5 QUALIFICATIONS

- A. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.7 WARRANTY

- A. Provide 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include materials and workmanship, satisfactory operation, and contain any limitations of items specified herein.

1.8 MAINTENANCE

- A. Provide Installers maintenance contract under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, commencing on Date of Substantial Completion and extending for a period of one year. Maintenance contract shall include the following:
 1. Emergency callback service for the grilles.
 2. Annual examinations of the installation during regular working hours by trained employees of the grille manufacturer.
 3. All necessary adjusting, greasing, and oiling.
 4. Cleaning supplies and parts necessary to keep the equipment in proper operation, except any parts needed due to misuse, accident, or neglect caused by other trades.

- B. Repair work shall be carried out only by the grille installer's personnel, using only standard parts furnished by the grille manufacturer. Maintenance shall be carried out directly by the installer and shall not be assigned or transferred to any agent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer and grille model: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Overhead Door Company, Lewisville, TX, product: "Model 671".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Overhead Door Company, Lewisville, TX.
 - 2. AlumaTec Pacific Products., North Salt Lake UT.
 - 3. Cornell Iron Works, Inc., Mountaintop PA.
 - 4. Raynor, Dixon IL.

2.2 COILING GRILLE COMPONENTS

- A. Grille Operation: Design grille assembly, including operator, to operate for not less than 50,000 cycles.
- B. Curtain: Straight lattice grille pattern, comprised of 5/16 inch (8mm) round ASI series 300 stainless steel bars spaced not more than 2 inch vertical centers, flexibly connected by eyeleted 3/4 inch stainless steel vertical links, equipped with tube spacers to maintain vertical link alignment.
 - 1. Spacing of horizontal bars: 2 inches (50 mm).
 - 2. Spacing of vertical links: 6 inches (150 mm).
- C. Counterbalance: Oil tempered helical torsion springs, housed in steel pipe barrel, supporting the curtain with a deflection not exceeding 0.03 inch per foot of width, equipped with ball or roller bearings, and adjustable by means of external tension wheel.
- D. Brackets: Minimum 5/16-inch thick steel plate, for supporting barrel, counterbalance mechanism, and hood, with a high factor of safety.
- E. Guides: Heavy extruded aluminum shapes, of sizes indicated on the approved shop drawings, containing hard vinyl inserts to eliminate metal to metal contact, and equipped with double locking bars to engage end links and prevent grille from pulling out of guides under excessive pressure.
- F. Locks: Pin tumble single unit mechanism, installed on one jamb, and designed to accommodate cylinders provided by Section 08 71 00 - DOOR HARDWARE.
- G. Bottom bar at B171 Security Office: Type 304 stainless steel tubular bottom bar with keyed lock.
- H. Finishes:

1. Stainless steel: Number 5 satin finish, factory polished.
2. Concealed steel and galvanized steel components: Manufacturer's standard baked-on prime coating, white, light tan, or light grey color, of a type which will readily accept field-applied finish coatings.

2.3 OPERATION

- A. Manual Crank Hoist (B171 Security Office, 2 grilles): Provide crank hoist operator including crank gear box, steel crank drive shaft and geared reduction unit. Fabricate gear box to completely enclose operating mechanism and be oil-tight.
- B. Electric Motor Operator: Equal to Overhead Door, product "Model SG" or approved equal, continuous duty, UL listed, totally enclosed fan cooled gear head operator(s) rated ½ hp (min.) or as recommended by door manufacture for size and type of door, 208 volts, 3 phase. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, emergency manual chain hoist provided up to 2 hp and control station(s). Motor shall be high starting torque, industrial type, with overload protection. Primary speed reduction shall be heavy-duty gears running in grease or oil bath with mechanical braking to hold the door in any position. When equipped, the emergency manual chain hoist assembly is automatically disengaged when motor is energized. A disconnect chain shall not be required to engage or release the manual chain hoist. Operator drive and door driven sprockets shall be provided with minimum No. 50 roller chain. Operator shall be capable of driving the door at a speed of 6 to 9 inches per second (15 to 23 cm/sec). Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door. The motor shall be removable without affecting the limit switch settings. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.
 1. Control Station: Flush mounted, "Open/Close" key switch with "Stop" push button; NEMA 1B.
- C. Sensing Edge: Provide automatic reversing control by an automatic sensing switch within neoprene or rubber astragal extending full width of grille bottom bar.
 1. Provide an electric sensing edge device. Contact before door fully closes shall cause door to immediately [stop downward travel and reverse direction to the fully opened position] [stop downward travel]. Provide a self-monitoring wireless sensing edge connection to motor operator eliminating the need for a physical traveling electric cord connection between bottom bar sensing edge device and motor operator. Supervised system alters normal door operation preventing damage, injury or death due to an inoperable sensing edge system.
- D. Locking: Provide key locking chromone bolts at each rail. Provide keylock at stainless steel tubular bottom bar at B171 Security Office.

2.4 FABRICATION

- A. Do not fabricate grilles until all specified submittals have been submitted to, and approved by, the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as indicated on reviewed and approved shop drawings.
- B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

- A. Perform installation of all items furnished hereunder, except as otherwise specified, in accordance with the approved shop drawings and the recommendations of the manufacturer.
- B. Set entire assembly including grilles, guides, and hardware, plumb and true to line, to assure smooth operation. Brace guides internally to provide a completely rigid installation. Attach jambs with not less than 3/8 inch steel bolts spaced not more than 30 inches apart.
- C. Coordinate installation of electrical service for coiling grille with Division 16 - ELECTRICAL. Complete power and control wiring from disconnect to unit components.

3.3 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work. Maximum variation from plumb or level: 1/16 inch. Maximum variation in longitudinal or diagonal warp: 1/8 inch per 10 foot straight edge.

3.4 ADJUSTING

- A. Adjust grilles, hardware and operating assembly as required to ensure a smooth operation without binding.

3.5 CLEANING

- A. Remove all protective films and coverings from assembly components, and clean grilles and guides. Remove tools, equipment and all rubbish and debris from the work area, caused by the work of this Section; leave area in broom-clean condition.

End of Section

Section 08 35 15
PANEL FOLDING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install folding aluminum and glass panel system, including aluminum frames, glass panels, sliding and locking hardware, designed to provide an operable glass wall.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work to receive work of this Section.
- E. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural stud framing at exterior walls.
- F. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, and nailers.
- G. Section 06 40 00 – ARCHITECTURAL WOODWORK: Hinged closure panel at stack pocket.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 1. AAMA 611-12 – Voluntary Specification for Anodized Architectural Aluminum.
 2. AAMA 612-02 – Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum.
 3. ASTM C 1036 - Flat Glass.
 4. ASTM C 1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
 5. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 6. Federal Safety Standards for Architectural Glazing Materials 16CFR1201.
 7. SGCC: Certified Products Directory, and Certification Guidelines.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 2. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions.
 3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 4. Shop drawings:
 - a. 1/4 inch scale elevations and plans.
 - b. Indicate dimensioning, general construction, component joining, connections and locations, and hardware locations.
 5. Selection samples:
 - a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
 - b. Provide additional samples as requested by Architect for initial selection of colors and finishes.
 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Provide complete, precision built, engineered, pre-fitted unit by a single manufacturer.
- B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
- C. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.7 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.8 WARRANTY

- A. Provide manufacturer's standard 10 year warranty for rollers and seal failure for insulated glass and 2 year warranty for all other components from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Nana Wall Systems, Inc., Product: "HSW60" Thermally Broken Aluminum-Framed Single Track Sliding System with "Concept 2" stacking configuration.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Nana Wall Systems, Inc., Corte Madera, CA.
 - 2. DORMA, New York, NY.

2.2 MATERIALS

- A. Frame and Panels: From manufacturer's standard profiles, provide head jamb, side jambs, and panels with dimensions shown on drawings. Provide standard bottom rail width.
 - 1. Aluminum: Extrusions with nominal thickness of .098 inch (2.5mm). Alloy specified as AlMgSi 0.5 with strength rated as 6063-T5 or F-22 (European standard).
- B. Glass: Tempered safety glass 1/4 inch thick.

- C. Glazing: Provide APTK or EPDM gaskets and extruded aluminum snap-in glazing bead for dry glazing per manufacturer's instructions. Stops to provide for specified glass thickness.
- D. Locking Hardware and Handles: Provide manufacturer's standard flat handle and concealed two point locking hardware operated by 180 degree turn of handle between each pair of bi-folding panels and on swing panels of configurations with a swing panel.
- E. Sliding/Bi-Folding Hardware: Provide manufacturer's standard combination sliding and bi-folding hardware with top and bottom tracks.
 - 1. For each pair of bi-folding panels, provide four wheeled coated with toughened Polyamide upper running carriage and lower guide carriage.
 - 2. Provide manufacturer's standard hinges and stainless steel hinge pins.
 - 3. Adjustment: Provide system capable of specified amount of adjustments without removing panels from tracks.
- F. Accessories:
 - 1. Threshold: Provide matching aluminum raised E6 EV1 clear anodized aluminum flush sill.
 - 2. Weather stripping: Provide manufacturer's standard double layer APTK, EPDM, or brush seals at both the inner and outer edge of door panels or on frame for sealing between panels and between panel and frame.
 - 3. Provide tapered pins or machine screws for connecting frame components.

2.3 ACCESSORIES

- A. All anchors and fasteners, including screws, nuts, bolts, rivets, and other fastening devices shall be of tempered aluminum or non-magnetic type 302/304 stainless steel, warranted by the manufacturer to be non-corrosive and compatible with aluminum frame members. All such devices shall be of suitable type and adequate capacity for each intended purpose.
 - 1. Finished aluminum work shall generally be without use of exposed fasteners. Provide exposed fasteners only where acceptable to Architect, finish to match surrounding aluminum.

2.4 FACTORY FINISHING

- A. Finish: Powder coated conforming to AAMA 603.8 or 605.2; As selected from range of RAL powder coated and wet applied finishes available from manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of substrate and project conditions.

3.2 INSTALLATION

- A. Perform the installation work in strict accordance with the approved shop drawings, and the manufacturers' installation instructions.
- B. Installer to provide anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.
 - 1. If necessary, provide drain connections from lower track.
 - 2. Install panels, and hardware in accordance with manufacturer's recommendations and installation instructions.
- C. No permanent exposed to view labels of any kind will be permitted to remain on the panels, frames or glass.

3.3 TOLERANCES

- A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities. Erect panels plumb and level, free of warp or twist.
 - 1. Install 1/16 inch per 10 feet, non cumulative, maximum variation from plumb.
 - 2. Install 1/32 inch maximum misalignment of two adjoining members abutting in plane.

3.4 ADJUSTING

- A. Adjust panels and hardware for smooth operation and tight fit. Lubricate hardware and other moving parts.
- B. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces with shop-coat finish material, supplied with the various items to be furnished hereunder.

3.5 CLEANING

- A. Clean work under provisions of Section 01 73 00 – EXECUTION.

End of Section

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Section 08 35 23
ACCORDION FOLDING FIRE DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install electrically-operated horizontal sliding, accordion-type fire rated doors, complete with connection to fire alarm system, operating hardware and mechanisms, and all related items.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking for accordion door.
- F. Section 07 92 00 - .JOINT SEALANTS: Perimeter sealant and backup materials.
- G. Section 09 22 16 – NON-STRUCTURAL METAL FRAMING: Support for accordion door
- H. Division 26 – ELECTRICAL: Electrical including power and fire alarm wiring to accordion door.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 152 – Methods of Fire Tests of Door Assemblies.
 - 2. NFPA publication 80 – Fire Tests of Door Assemblies.
 - 3. UL 10B – Fire Tests of Door Assemblies.
 - 4. Wamock-Hersey – Certification Listings for fire doors.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Fabricator's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.

2. Shop drawings: Fully dimensioned, large scale sections and details of each type accordion door construction, tracks, guides, counterbalancing and operating mechanisms, electrical characteristics, and related items. Include complete installation details reflecting site conditions required for stacking depth, storage pocket width and height of header above finished floor.
 3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
1. Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.
 2. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.5 QUALIFICATIONS

- A. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.6 REGULATORY REQUIREMENTS

- A. Fire doors shall be listed by Underwriters Laboratory as Special Purpose Fire Doors having a one and on-half hour fire-resistive rating in accordance with the requirements of UL 10B and ASTM E-152.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier.
- C. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.8 COORDINATION

- A. Electrical rough-in shall be in-place and ready for final connection when fire doors are erected. Assure access to and proper clearance for motor operators.
- B. After testing the fire-alarm system, automatic-closing fire doors shall be re-set to the original position.

1.9 WARRANTY

- A. Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Guarantee all components to be free from defects in material and workmanship, under normal use, for a period of 12 months after Final Completion of the Project.
 - 2. Repair or replace defective material free of charge. Parts replaced due to normal wear or abuse are excluded.
 - 3. Signed acceptance or customer use of system shall commence the warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Won-Door Corporation, Salt Lake City, UT, Product: "FireGuard model FGCS-180".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following:
 - 1. Won-Door Corporation, Salt Lake City, UT
 - 2. McKeon Door Company, Belleport, NY.

2.2 COMPONENTS

- A. Construction: Shall consist of two parallel, accordion-type walls of panels independently suspended with no pantographs or interconnections except at the leadpost.
 - 1. Fire rating shall be as listed UL for special purpose doors with a rating of 90 minutes.
- B. Panels: Formed of 24 gage enamel coated steel and V-grooved for strength and resilience with full height 24 gage enamel coated steel hinges.
- C. Suspension System: Two 14 gage cold rolled steel tracks on 8 inch centers attached to the overhead structural support.
 - 1. Suspend lead post with 8 wheel ball bearing trolley.
 - 2. Suspend each panel with 3/8 inch diameter steel hanger pin and a 1 1/4 inch diameter ball bearing roller.

- D. Lead Post: 24 gage cold roller steel connected by specially formed steel panels. Internally mounted stabilizer bar to keep post plumb and in alignment during operation.
- E. Perimeter Seal: Continuous extruded vinyl sweeps attached to the top and bottom of the fire doors
- F. Hanging weight: 5.5 pounds per square foot.

2.3 AUTOMATIC CLOSURE SYSTEM:

- A. System shall consist of an electronic control box, motor drive assembly and leading edge obstruction detector. In case of fire, closing system shall be activated by the building's fire/smoke detection equipment and automatically close the accordion door. Motors shall be operated by DC power supplied from a 12-volt maintenance-free battery located in the electronic control box. Batteries shall be continuously charged by the buildings electrical service and be automatically maintained at capacity. Accordion fire door may be operated manually in either the conventional or emergency mode.
 - 1. Type: "Pocket Drive" for operating bi-parting openings with closing system located at both ends of door and include a rest button built into the door.
- B. Electronic Control Box shall house the microprocessor logic board, interconnect board, 12-volt maintenance-free battery, power supply charger, and motor drive assembly in a minimum one (1) hour rated enclosure. The microprocessor shall initiate a loud audible signal should any of the following conditions arise:
 - 1. High or low AC voltage
 - 2. High or low DC voltage
 - 3. Drive train malfunction
 - 4. Limit switch malfunction
 - 5. Key switch malfunction
 - 6. ROM or RAM check-sum error
- C. Motor Drive Assembly shall consist of a DC gear-motor, limit switch, torque limiting device, drive sprocket and clutch. The motor shall drive the fire door by means of a chain attached to the stabilizer bar trolley. Motor drive assembly shall be located within a one (1) hour fire rated enclosure.
- D. Key Switch Module: Shall consist of a key switch and high decibel alarm.
- E. Leading Edge Obstruction Detector-fire doors shall be equipped with a pressure sensitive leading edge such that each contact with an obstruction shall cause the door to stop and pause before attempting to re-close. Fire doors can be manually opened at any time by pushing against the leading edge.
- F. Fire Exit Hardware shall be located on both sides of each fire door. In emergency mode a slight pressure on the hardware will cause the door to open a minimum of 32 inches, pause for 3 seconds, then automatically close. The hardware shall be field programmable to allow automatic opening distances of up to the entire opening width, In the conventional mode, the hardware is used to open the door and move it back into the storage pocket.

G. Specified Accessories:

1. Vision Panel: frame and clear glass assembly with UL listings of 1-1/2 hours.

2.4 FABRICATION

- A. Do not fabricate accordion door until all specified submittals have been submitted to, and approved by the Architect.

2.5 FINISH

- A. Color shall be selected by the architect from manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as indicated on reviewed and approved shop drawings.
- B. Beginning of installation means acceptance of existing project conditions.

3.2 PREPERATION

- A. Openings shall be to the dimensions shown on the approved shop drawings, plumb and level.
- B. Headers shall be leveled with the finished floor to within +/-1/16" (.002) tolerance over the entire length of the opening.

3.3 INSTALLATION

- A. Perform installation of all items furnished hereunder, except as otherwise specified, in accordance with the approved shop drawings and the recommendations of the manufacturer.
- B. Set entire assembly including doors, track, and hardware, plumb and true to line, to assure smooth operation. Brace guides internally to provide a completely rigid installation.
- C. Coordinate installation of sealants and backing materials at frame perimeter of coiling overhead door as specified in Section 07 92 00 – JOINT SEALANTS.

3.4 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work. Maximum variation from plumb or level: 1/16 inch. Maximum variation in longitudinal or diagonal warp: 1/8 inch per 10 foot straight edge.

3.5 ADJUSTING

- A. Adjust for smooth, quiet operation. Verify that all operations are functional and meet the requirements of applicable codes and regulations.

End of Section

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Section 08 43 13
ALUMINUM-FRAMED STOREFRONTS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 08 00 05)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 08 00 05 – METAL WINDOWS TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 08 00 05.

1.2 SUMMARY

- A. The work of this Section consists of aluminum entrances and storefronts where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
1. Prefinished aluminum interior storefront framing and exterior storefront ribbon systems, of the types specified herein, all required integral reinforcing, bracing members, deflection heads, sub-sills and related accessories for the framing systems, and all angles, clips, and other items required to anchor the systems to the building structure.
 2. Prefinished aluminum interior storefront doors and hardware.
 3. All vision glass, and glazing materials.
 - a. Structural silicone glazing where indicated on Drawings.
 4. Prefinished aluminum formed brake-metal work, closures, flashings, flashing as indicated on the Drawings and similar items, in conjunction with aluminum entrance and storefront framing.
 5. Metal to metal sealing of aluminum assemblies.
 6. Shimming and fasteners required for installation.
 7. Sealant and compressible backup beads between framing members and for perimeter joints, air barrier connection to storefront ribbon frame.
 8. Integral steel reinforcement in frames.
 9. Mock-up elements for field panel.
- C. Install the following furnished under the designated Sections:
1. Hardware furnished under Section 08 71 00 - DOOR HARDWARE.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid

proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work to receive work of this Section.
- G. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural stud framing at exterior walls.
- H. Section 06 10 00 - ROUGH CARPENTRY: Wood blockings, nailers.
- I. Section 07 21 00 - THERMAL INSULATION: Perimeter vapor and air seal between storefront frame and adjacent construction.
- J. Section 07 92 00 - JOINT SEALANTS: Requirements for sealant and back-up materials.
- K. Section 08 00 05 – METAL WINDOW TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- L. Section 08 51 13 - ALUMINUM WINDOWS:
 - 1. Fixed sash and operable individual aluminum windows as part of this Trade Contract.
 - 2. Glass types for aluminum framed storefront and curtain wall assemblies.
- M. Section 08 71 00 - DOOR HARDWARE: Furnishing finish hardware for the work of this Section.
- N. Section 08 80 00 - GLAZING: Glazing systems, other than the work described as part of this Trade Contract.
- O. Section 28 10 00 – UNIFIED SECURITY SYSTEM: Access control and security work related to aluminum framed storefronts.

1.4 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. AAMA 501 - Methods of Test for Metal Curtain Walls.
 2. AAMA 2605 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 3. ASCA 96 - Voluntary Specification for Performance of Organic Coatings on Architectural Aluminum Curtainwall, Extrusions and Miscellaneous Aluminum Components.
 1. AAMA 606.1 - Voluntary Guide Specification and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
 2. AAMA 611 – Voluntary Standards for Anodized Architectural Aluminum.
 3. AAMA 608.1 - Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
 4. AAMA 1503.1 – Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.
 5. AAMA SFM-1 - Aluminum Storefront and Entrance Manual.
 6. ANSI A 117.1 - Safety Standards for the Handicapped.
 7. ANSI Z 97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 8. ASTM A 123 - Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
 9. ASTM B 209 - Aluminum Alloy, Sheet and Plate.
 10. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 11. ASTM C 162 – Standard Terminology of Glass and Glass Products.
 12. ASTM C 509 – Elastomeric Cellular Preformed Gaskets and Sealing Materials.
 13. ASTM C 864 – Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 14. ASTM C 1048 – Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
 15. ASTM C 1193 – Standard Guide for Use of Joint Sealants.
 16. ASTM C 920 - Elastomeric Joint Sealants.
 17. ASTM D 523 – Standard Test Method for Specular Gloss.
 18. ASTM E 283 - Rate of Air Leakage through Exterior Entrance and storefront, Curtains Walls and Doors.
 19. ASTM E 330 Structural Performance of Exterior Entrance and storefront, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 20. ASTM E 331 - Test method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 21. ASTM E 2188 - Standard Test Method for Insulating Glass Unit Performance.

22. ASTM E 2189 - Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.
23. ASTM E 2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

B. General References The following reference materials are hereby made a part of this Section by reference thereto:

1. AAMA SFM-1 - Aluminum Storefront and Entrance Manual.
2. All applicable federal, state and municipal codes, laws and regulations for exits.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
2. Arrange keying, and schedule delivery of keys, with Owner.

B. Sequencing:

1. Field Measurements
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.6 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, fabrication methods, finishes, performance data, and installation instructions for each item furnished hereunder.
 - a. Provide additional information for glazing and sealant products; including chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
 - b. Provide hardware schedule and product data sheets for each type of hardware.
2. Shop Drawings:
 - a. 1/4 inch scale elevations and plans of each entrance and storefront system condition, indicate all hardware mounting heights.
 - 1) Indicate all types and thickness of glass.
 - b. Large scale design details; indicating sizes, types, and gauges of all metal components; expansion provisions, and glazing details.
 - 1) Provide details of perimeter conditions and typical joinery. Indicate which framing members run through and how joints are sealed.

- 2) Provide details of transition areas and modifications to standard system components.
 - 3) Provide details of bracing and stabilizing members; attachment clips and brackets; and complete installation details.
 - 4) Indicate building column line reference dimensions.
 - c. Provide reaction loads imposed on the structure, including all deadload, seismic, and windload reactions at each anchor location.
 - d. Design engineering shall be the responsibility of the framing systems manufacturer, and may vary from those indicated on the Contract Drawings, but basic sight lines shall be retained.
3. Selection Samples:
 - a. Color samples: Architect to select custom color including colors designated by coating manufacturer as premium. Up to two colors may be selected Architect to provide color samples.
 - b. Provide physical samples as requested by Architect for initial selection of colors and finishes.
 - c. Manufacturer's sample boards for sealant colors, for selections by the Architect.
 4. Verification Samples:
 - a. Provide operating hardware components in specified finishes as requested by Architect.
 - b. After receipt of selected standard colors from the Architect, submit at least two 12-inch long pieces of major metal extruded components of the systems, and 12 by 12 inch samples of finished aluminum sheet used for brake metal components, prefinished in the specified finish system in selected colors.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - e. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 - 1. Operation and Maintenance Data: For all hardware components furnished under this Section 08 43 13.
 - 2. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
- 1.7 QUALITY ASSURANCE
- A. General:
 - 1. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - 2. Except for glass, obtain system components required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of storefront framing.
 - B. Qualifications:
 - 1. Manufacturers: Minimum of 10 years experience in manufacturing of aluminum framed storefront systems.
 - 2. Professional Engineer Qualifications: Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in the Commonwealth of Massachusetts
- 1.8 PRE-INSTALLATION CONFERENCE
- A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.
- 1.9 MOCK-UP
- A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work. Mockup subject to testing under Section 01 43 25 – TESTING AGENCY SERVICES.
- 1.10 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver hardware scheduled for field installation packaged individually. Label and identify each package with door opening code to match hardware schedule.
 - a. Obtain receipts for when hardware is received by other trades.
 - B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures.
-

2. Protect materials from damage due to moisture, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - a. Protect finished metal surfaces from damage during fabrication work, shipping, storage, and erection. Protect pre-finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.11 SITE CONDITIONS

- A. Do not install sealant when ambient temperature is less than 40 degrees Fahrenheit.
 1. Maintain this minimum temperature during and 48 hours after installation of sealant.

1.12 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty:
 1. Manufacturer's written extended warranty for entrance and storefront systems, covering repair or replacement of any system which leaks, or exhibits defects in materials, finish, design, within 10 years from date of substantial completion of the General Contract. Failure due to defective materials or workmanship is deemed to include, but not to be limited to:
 - a. Failures in operation of operating component or components.
 - b. Leakage or air infiltration in excess of the specified standard.
 - c. Deterioration of finish to an extent visible to the unaided eye.
 - d. Defects which contribute to unsightly appearance, potential safety hazard, or potential untimely failure of the work of this Section or the Work as a whole.
 2. Glass manufacturer's standard 10 year guarantee covering insulating glass against defects in materials and workmanship, including failure of seals commencing at date of substantial completion of the General Contract.
 3. Finish System Warranty: polyvinylidene fluoride enamel finish 10 year coating warranty assigned specifically to project, covering film integrity (including chipping, crazing, pitting, and delamination), chalk resistance and color fading, color change.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on EFCO, Product: 402 Storefront System and EFCO, Product 945 Structurally Silicone-Glazed Storefront Ribbon System.

- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. EFCO (A Division of Pella), Monett MO.
 - 2. Kawneer North America (A Division of Alcoa), Norcross GA.
 - 3. Vistawall Group (A Division of Oldcastle Glass Engineered Products), Terrell TX.
 - 4. YKK AP America Inc., Austell GA.
- C. Sole Source: Manufacturer for the work of this Section shall be same as providing glazed curtainwall systems specified under Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS and aluminum windows specified under Section 08 51 13 – ALUMINUM WINDOWS.

2.2 DESCRIPTION

- A. General Description: Storefront framing systems: Integrated flush-glazed, outside glazed, stick fabricated system. Vertical and horizontal framing members shall be of shear block construction.
 - 1. System shall provide flush glazing on all sides for the indicated thickness of glass, with no projected glazing stops.

2.3 PERFORMANCE/DESIGN CRITERIA

- A. General: Design, fabricate, assemble and erect storefront system, and interfacing conditions with contiguous work, to ensure continuity of building enclosure vapor and air barriers and that all segments of the assemblies will be free from leakage under every condition of weather and exposure. In addition to the specified performance requirements, storefront system shall conform to, or exceed the requirements of the applicable building code and referenced industry standards for air infiltration, water infiltration, operating forces, deflection and deformation under load.
- B. Engineering criteria: The manufacturer for storefront system shall employ the services of a qualified structural engineer, registered to practice in the Commonwealth of Massachusetts, to prepare all calculations and other performance criteria for the respective systems, and bear all costs therefor. All shop drawings for the metal components of the respective systems shall bear the registration stamp of the engineer.
 - 1. Wind loading: Entrance/storefront system shall conform to the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments:
 - a. Basic Wind Speed: 134 miles per hour. (three-second-gust).
- C. Testing Requirements: Provide manufacturer's testing and submit test data. Demonstrate compliance with specified requirements.
 - 1. Test Sequence: Air infiltration testing shall precede water resistance testing.
- D. Test samples:
 - 1. Frame Sample(s) for air infiltration, water penetration and structural tests: Minimum sample size: 12'-0" high by 4'-0" wide.

2. Door Samples for air infiltration tests:
 - a. For single doors: Minimum size 3'-0" x 7'-0.
 - b. For double doors: Minimum size 6'-0" x 7'-0".

E. Frame:

1. Air infiltration through assembly: tested specimen in accordance with ASTM E 283, with a static pressure difference of 6.24 psf, shall not exceed 0.06 cfm per square foot of unit surface area.
2. Water resistance: test specimen in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf as defined in AAMA 501.
3. Deflection: test in accordance with ASTM E330 at a static air pressure difference of 31 psf (positive and negative).
 - a. Deflection of framing members perpendicular to the plane of the wall shall not exceed L/175 of its clear span.
 - b. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2 percent of their clear spans shall occur.
4. Uniform structural loading: test in accordance with ASTM E330 at a static air pressure difference of 1.5 times the design wind pressure prescribed by the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments. Test will result of no water leakage glass breakage, permanent damage to fasteners, permanent deflection in framing, or other damage which would cause the storefront be defective.
5. Condensation resistance tests (CRF): conform to AAMA 1503.1 for a minimum CRF of 56, and a maximum conductive thermal transmittance "U-Value" of U_c 0.63.

F. Entrance doors:

1. Air infiltration through assembly, tested in accordance with ASTM E283 with a static pressure difference of 1.57 psf.
 - a. For single doors, air infiltration shall not exceed 0.50 cfm per linear foot of perimeter crack.
 - b. For double doors, air infiltration shall not exceed 0.10 cfm per linear foot of perimeter crack.

2.4 FRAMING SYSTEM

- A. Interior storefront framing systems: Nominal dimension of 2 inch face width by 4-1/2 inch total depth, t system for center-set insulating glass.
- B. Exterior storefront framing systems: Nominal 2-1/4 inch face width by 4-1/2 inch total depth thermally broken system with structural silicone glazing where indicated on Drawings.

2.5 MATERIALS

- A. Framing and door members shall be of extruded aluminum 6063-T5, 6063-T6, or 6061-T6 alloy and temper, as recommended by manufacturer for strength, corrosion resistance and specified finish, complying with ASTM B 221.

- B. Sub-sill track shall be of special purposed high strength extruded aluminum in either 6351-T5 or 6061-T5 alloy and temper as recommended by manufacturer for strength, corrosion resistance and specified finish, complying with ASTM B 221.
- C. Formed flashings and closures shall be of aluminum Alloy/temper 5005-H34, minimum of 0.083 inch thick, complying with ASTM B 209 with end dams.
 - 1. Provide and install all miscellaneous formed aluminum work in conjunction with the aluminum frame work as detailed and as required to complete the work including but not limited to sills, mullion covers, closures, flashings.
- D. Aluminum sections shall be of sizes and profiles indicated on the approved shop drawing details; shall present straight, sharply defined lines and arises; and shall be free from defects impairing strength, durability, or appearance.
- E. Storefront base: 4-inch high storefront base as indicated on the Drawings, 4-1/2 inches deep with adjustable height sidelight. Provide manufacturer's standard unit equal to EFCO Model No. Y001. Refer to Drawings and manufacturer's standard details for interior and exterior units.

2.6 ENTRANCE DOORS (NON-THERMAL)

- A. Aluminum doors shall be extruded aluminum, preglazed, single acting, hinged doors, medium stile-and-rail type. Subject to compliance with the requirements specified herein, products which may be incorporated in the work include, the following or approved equal:
 - 1. EFCO model "D300 Medium Stile Door.
 - 2. Kawneer model: "350".
 - 3. YKK AP America: "35D" series.
- B. Entrance doors:
 - 1. Wall thickness of stile and rail extrusions: not less than 0.125 inch.
 - 2. Wall thickness of glazing stops: not less than 0.050 inch.
 - 3. Thickness of door: 2-1/4 inches.
 - 4. Width of door stiles, top and bottom rails: As indicated on the Drawings.
 - 5. Fabricate doors with hairline joints at corners of stiles and rails; provide heavy concealed reinforcement brackets secured with screws and welded.
 - 6. Weatherstripping: Wool pile type.
 - 7. Interior side of thresholds abutting walk off mats to be trimmed square.
- C. Door frame: Nominal 2 inch width by 4-1/2 inches deep.
 - 1. Wall thickness of frame extrusions: not less than 0.125 inch.
 - 2. Utilize shear block type construction throughout. No visible raw edges are permitted at joints.
 - 3. Weatherstripping: Wool pile type.

2.7 DOOR HARDWARE

- A. Hardware shall be furnished under Section 08 71 00 - DOOR HARDWARE, unless otherwise indicated to be furnished as part of the work of this Trade Contract and

installed by aluminum entrance and storefront framing system manufacturer, conforming to governing laws and building codes.

1. Install all reinforcing required and prepare doors for finished hardware specified.

B. Thresholds, weatherstripping and door sweeps as recommended by door manufacturer.

2.8 EXTRUDED ALUMINUM & FORMED SHEET ALUMINUM BRAKE METAL WORK

A. Fabricate and install all extruded aluminum and formed sheet aluminum brake-metal work in conjunction with the aluminum storefront work as detailed and as reasonably required to complete the work including sill extensions, snap trim pieces, jamb and sill trim, closures, coverings, flashings and other miscellaneous extruded and formed brake-metal work in conjunction with the Work of this Section.

1. Provide extruded shapes wherever possible, reserving formed work for conditions where extrusions are not applicable.

2. Provide sheet metal panning not less than 0.060 inch thick.

3. Fasten trim clips, at not more than 16 inches on center.

4. Finish and color of brake metal and panning to match storefront framing.

B. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent "oil canning" or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.

2.9 GLASS AND GLAZING MATERIALS, TYPES AND LOCATIONS

A. Glass types identified in this Section are specified under Section 08 51 13 – ALUMINUM WINDOWS included as part of this Trade Contract.

1. General: For locations of glass types, comply with the following descriptions and refer to Aluminum Frame (Curtain wall and Storefront), Window, and Door Types and Schedules as well as Interior and Exterior Elevations for additional locations, and as additionally noted on Drawings.

B. Glazing materials, including all sealant, tapes and gaskets, shall be as recommended by the aluminum storefront/entrance system manufacturer, and shall be in strict accordance with the manufacturer's printed instructions. It shall be the responsibility of the aluminum system manufacturer to provide glazing materials which are appropriate for the various uses and conditions, compatible with each other and also compatible with the materials with which in contact.

1. Continuous cushions beneath all glazing materials: Extruded dense EPDM rubber gaskets (60 +/- Shore A durometer), complying with ASTM C 864.

2. Continuous and recessed spacers: Extruded, closed-cell sponge neoprene or EPDM gaskets (40 +/- 5 Shore A durometer) complying with ASTM C 509.

C. Provide black hermetic spacers for all insulated glass units.

D. All tempered glazing units shall be installed with "draw" marks in the same orientation.

2.10 FABRICATION

- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
 - 1. Check dimensions of openings for entrance and storefront systems in the actual construction by accurate field measurement before fabrication. When necessary to proceed with the fabrication without field measurements, coordinate and control installation tolerances to ensure proper fit of the aluminum entrance and storefront systems.

- B. Factory / Shop Assembly: Before shipment, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble only for shipment and installation.
 - 1. Except for application of hardware, do not use exposed fasteners. For hardware, use Phillips flat-head machine screws; match finish of member or hardware being fastened.
 - 2. Do not drill and tap for surface-mounted hardware until installation.
 - 3. Perform fabrication, including cutting, fitting, forming, drilling and grinding to prevent damage to exposed finish surfaces. For hardware, perform prior to application of finishes.
 - 4. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.
 - 5. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator.
 - 6. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

- C. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings

2.11 FINISHES

- A. Aluminum finish for exterior storefront construction, brake metal and panning: Shop-applied, fully oven cured Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), NAAMM - Metal Finishes Manual, and the following:
 - 1. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
 - 2. Finish Coating shall be manufactured as one of the following products:
 - a. Glidden Company; product "Visulure."
 - b. Morton International; product "Fluoroceram CL."
 - c. PPG Industries Inc.; product "Duramar XL."
 - d. Valspar Corp., product: "Flurothane."
 - 3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.

4. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
 5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
 6. Finish Coat (Color Coat): Polyvinylidene flouride enamel averaging 0.70 to 0.80 mil dry film thickness.
 7. Top Coat: Polyvinylidene flouride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
 8. Color and Appearance: Provide custom colors as provided by Architect including colors designated by the coating manufacturer as "bright," "premium," "pearlescent," or "metallic". Colors shall be in configuration approved by the Architect.
 - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.
- B. Concealed Steel Items: Galvanized in accordance with ASTM A 386 to 2.0 ounces per square foot.
- C. Isolation coating to cementitious and dissimilar materials: Apply one coat of bituminous paint or other acceptable coating to concealed aluminum surfaces in contact with cementitious and dissimilar materials

2.12 ACCESSORIES

- A. All anchors and fasteners, including screws, nuts, bolts, rivets, and other fastening devices shall be of tempered aluminum or non-magnetic type 302/304 stainless steel, warranted by the manufacturer to be non-corrosive and compatible with aluminum frame members. All such devices shall be of suitable type and adequate capacity for each intended purpose.
1. Finished aluminum work shall generally be without use of exposed fasteners. Provide exposed fasteners only where acceptable to Architect, finish to match surrounding aluminum.
 2. Provide continuous aluminum angle supports for aluminum framed storefronts.
- B. Shims: "U" shaped structural shims complying with the following:
1. Material: High impact polystyrene, interlocking or non-interlocking to achieve necessary thicknesses.
 2. Sizes: 1-1/2 by 2 inch by 1/16 inch thick, Part No. WS 1060 (blue); 1-1/2 by 2 inch by 1/8 inch thick, Part No. WS 1125 (red); 1/2 by 2 inch by 1/4 inch thick, Part No. WS 1250 (black).
 3. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. AccuTrex Products, Inc. Canonsburg, PA.
 - b. Accushim, Lyons, IL.
 - c. Mr. Shims, Villa Park, IL.
- C. Sealant and backer materials:

1. Sealant used within system: As recommended by manufacturer.
 2. Perimeter Sealant: Multi-component gun-grade polyurethane sealant Low modulus type, non-sagging, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type M, Class 25, Grade NS, use NT, M, A and O with a minimum movement capability of ± 50 percent, equal to the following:
 - a. Tremco, Beachwood OH.; product "Dymeric 240 / Dymeric 240FC".
 - b. BASF Sonneborn Building Products Inc., Minneapolis MN.; product, "Sonolastic NP2".
 - c. Pecora Corporation, Harleysville PA.; product "Dynatrol II".
 - d. Sika Corp, Lyndhurst NJ; product, "Sikaflex 2CNS".
 3. Compressible joint bead back-up: Compressible closed cell polyethylene, extruded polyolefin or polyurethane foam rod 1/3 greater in diameter than width of joint. Provide one of the following, or equal.
 - a. Nomaco, Inc., Zebulon NC, product "Foam Pak II".
 - b. Sonneborn Building Products Inc., Minneapolis MN, product "Sonofoam".
 - c. Tremco, Beachwood OH, product "Joint Backing".
 - d. Applied Extrusion Technologies, Inc., Middletown DE, product "Sof Rod".
- D. Structural silicone glazing:
1. Glazing sealant for flushed glazed, capless system
 - a. Structural Flush Glazed Joints: High performance silicone sealant applied in accordance with manufacturer's recommendations.
 - b. Non-structural Flush Glazed Joints and Weather Seal Joints: Silicone sealants applied in accordance with manufacturer's recommendations.
 - c. Structural silicone sealant performance requirements:
 - 1) Hardness: ASTM D2240 Type A, 30 durometer.
 - 2) Ultimate Tensile Strength: ASTM D412, 170 psi.
 - 3) Tensile at 150% Elongation: ASTM D412, 80 psi.
 - 4) Joint Movement Capability after 14 Day Cure: ASTM C719, +/- 50%.
 - 5) Peel Strength (aluminum, glass, concrete) after 21 Day Cure: ASTM C794, 50 ppi.
 - d. Structural silicone shall not be used to support dead weight of vertical glass or panels.
- E. Continuous jamb fillers, backer materials and sealants: As required to provide continuous closure of frame voids for installation of perimeter sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of

this Section. Notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

1. Beginning of installation means acceptance of project conditions.

B. Evaluation and Assessment:

1. Verify that field measurements are as indicated on shop drawings.

3.2 ERECTION

- A. Coordinate the installation of the entrance and storefront systems, and related items to be furnished hereunder with the work of the other trades responsible for providing receiving and interfacing materials, and ensure that all receiving and supporting surfaces have been completed and ready to receive the work of this Section.
- B. Perform the installation work in strict accordance with the approved shop drawings, and the manufacturers' installation instructions, and the herein-referenced standards. Erect the various systems and items plumb and true, in proper alignment and relation to established lines and grades.
- C. All shims shall be aluminum. Wood shims will not be acceptable.
- D. Provide sheet aluminum closures, extruded sub-sills with dams, deflection tracks, as indicated or required to complete the Work. Where exposed provide same finish as adjacent storefront construction.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install and set thresholds in bed of water caulk mastic and secure.
- G. Perform all glazing work in accordance with FGMA Glazing Manual SIGMA and LSGA standards, and with the entrance and storefronts framing system manufacturers' recommended glazing procedures.
1. All glass at entrance and storefront frames shall be set by use of resilient glazing gaskets between both interior and exterior stops and glass, weathertight, in strict accordance with the printed glazing instructions of the manufacturers of aluminum work and glazing materials.
 2. All glass at aluminum doors shall be set by the use of resilient glazing gaskets provided on the glazing stops, in weathertight, in strict accordance with the printed glazing instructions of the manufacturer.
- H. Ensure that all metal-to-metal and metal-to-glass joints are completely weathertight, and that adequate provisions have been made to permit expansion and contraction in the metal.
- I. Except as required by code, no permanent exposed to view labels of any kind will be permitted to remain on the doors, frames or glass.

3.3 TOLERANCES

- A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities. Erect the aluminum entrance and storefront systems plumb and level, free of warp or twist.
 - 1. Install 1/16 inch per 10 feet, non cumulative, maximum variation from plumb.
 - 2. Install 1/32 inch maximum misalignment of two adjoining members abutting in plane.

3.4 ADJUSTING

- A. Adjust doors and hardware for smooth operation and tight fit. Lubricate hardware and other moving parts.
- B. Lubricate hardware and other moving parts.

3.5 CLEANING

- A. Clean work under provisions of Section 01 70 00 – EXECUTION.
 - 1. Clean storefront system promptly after installation, exercising care to avoid damage. Thoroughly clean all metal surfaces free from dirt, handling marks, packing tapes, and foreign matter; remove excess sealant.
 - 2. Remove labels from glass surfaces.
 - 3. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess sealing compounds, mortar, paint, dirt, and other contaminants.
 - a. All exposed edges of sealant and gaskets shall be left smooth, uniform in line, and with edges neatly struck.

3.6 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
 - 1. The manufacturer shall advise the Contractor of protective treatment and other precautions required by him through the remainder of construction to ensure that the work of this Section will be without damage or deterioration at the time of Substantial Completion of the Contract.
- B. Repair Broken Glass:
 - 1. Replace in kind and thickness all glass breakage caused by the work performed under this Section, and bear all costs therefor.
 - 2. Replace in kind and thickness all glass breakage, caused by other trades, because of negligence or any other reasons, with the costs being borne by the trade at fault, or the Contractor, as applicable.

End of Section

Section 08 44 13
GLAZED ALUMINUM CURTAIN WALLS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 08 00 05)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 08 00 05 - METAL WINDOWS TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 08 00 05.

1.2 SUMMARY

- A. Design, engineer, furnish and install aluminum framed glazed curtain wall system. Work includes, but is not limited to:
1. Prefinished aluminum curtainwall framing system, including all angles, clips, and other items required to anchor the systems to the building structure.
 2. All vision glass, and glazing materials.
 - a. Structural silicone glazing where indicated on Drawings.
 3. Prefinished aluminum formed brake-metal closures, flashings in conjunction with curtain wall framing.
 4. Metal to metal sealing of aluminum assemblies and sealing of assemblies to exterior wall panels.
 5. Integral fire stops and air and vapor barrier at floor slabs.
 6. Sealant and compressible back-up beads between framing members and for perimeter joints as noted on Drawings to receive sealant by this Section.
 7. Curtain wall transition membrane, adhesives and sealants connecting curtain wall framing to AVB-flashing.
 8. 0.40 aluminum sill flashing with end dams glazed into curtain wall framing system.
 9. Full perimeter backer rod and sealant between curtain wall frame and air vapor barrier - adjacent to the interior side of curtain wall transition membrane.
 10. Mock-up unit elements for field panel.
 11. Custom pressure plate caps.
 12. Integral steel reinforcing in mullions.
 13. Prefinished aluminum entrance doors and hardware.
 14. Furnish and install all firestopping related to this scope of work. Refer to Section 07 84 00 - FIRESTOPPING for requirements.
 15. Anchor brackets and fasteners for attachment to structure.
 16. Stainless steel flashing at grade conditions.
- B. Install the following furnished under the designated Sections:

1. Mineral wool insulation at curtain wall voids between insulated metal panel, spandrel glass and aluminum infill as furnished by Section 07 21 00 – THERMAL INSULATION.
 2. Project in side hinged windows (vents) and security screens furnished under Section 08 51 13 – ALUMINUM WINDOWS.
 3. Hardware furnished under Section 08 71 00 – DOOR HARDWARE.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 45 29 – TESTING LABORATORY SERVICES.
- C. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- D. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- E. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- F. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- G. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- H. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work to receive work of this Section.
- I. Section 05 40 00 - COLD-FORMED METAL FRAMING: Structural stud framing at exterior walls.
- J. Section 06 10 00 - ROUGH CARPENTRY: Wood blockings, nailers.
- K. Section 07 92 00 - JOINT SEALANTS: Requirements for sealant and back-up materials.

- L. Section 08 00 05 – METAL WINDOW TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- M. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Entrance doors, frames, vestibule and storefront framing, and related glazing, as part of this Trade Contract.
- N. Section 08 51 13 - ALUMINUM WINDOWS:
 - 1. Fixed sash and operable individual aluminum windows as part of this Trade Contract.
 - 2. Glass types for glazed aluminum curtain wall assemblies as part of this Trade Contract.
- O. Section 08 80 00 - GLAZING: Glazing systems other than the work described as part of this Trade Contract.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AAMA - Metal Curtain Wall, Window, Storefront and Entrance Guide Specification Manual.
 - 2. AAMA - Aluminum Curtain Wall Design Guide Manual, (1989 edition)
 - 3. AAMA - Curtain Wall Manual #10.
 - 4. AAMA - Series Number 12 Structural Sealant Glazing Systems.
 - 5. AAMA 2605 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 6. ASCA 96 - Voluntary Specification for Performance of Organic Coatings on Architectural Aluminum Curtainwall, Extrusions and Miscellaneous Aluminum Components.
 - 7. ASTM E 283 - Rate of Air Leakage through Exterior Entrance and storefront, Curtains Walls and Doors.
 - 8. ASTM E 330 Structural Performance of Exterior Entrance and storefront, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - 9. ASTM E 331 - Test method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- B. The following reference materials are hereby made a part of this Section by reference thereto:
 - 1. Applicable recommendations and standards of AA, SIGMA and FGMA.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, fabrication methods, finishes, performance data, and installation instructions for each item furnished hereunder.

- a. Provide additional information for glazing and sealant products; including chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
2. Sample Warranties: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
3. Certifications:
 - a. Sealed glass unit manufacturer's certificate indicating conformance with standards specified herein and in Section 08 80 00 - GLAZING.
4. Shop drawings:
 - a. 1/4 inch scale elevations and plans.
 - 1) Indicate all types and thickness of glass.
 - b. Large scale design details of curtain wall systems; indicating sizes, types, and gauges of all metal components; expansion provisions, and glazing details.
 - 1) Provide details of perimeter conditions and typical joinery. Indicate which framing members run through and how joints are sealed.
 - 2) Provide details of transition areas and modifications to standard system components.
 - 3) Provide details of bracing and stabilizing members; attachment clips and brackets; and complete installation details.
 - 4) Indicate building column line reference dimensions.
 - c. Design engineering shall be the responsibility of the framing systems manufacturer, and may vary from those indicated on the Contract Drawings, but basic sight lines shall be retained.
5. Selection Samples:
 - a. Color samples: Architect to select custom color designated by the coating manufacturer as premium or metallic. Up to two colors may be selected Architect to provide color samples.
 - b. Provide physical samples as requested by Architect for initial selection of colors and finishes
 - c. Manufacturer's sample boards for sealant colors, for selections by the Architect.
6. Verification Samples:
 - a. After receipt of selected standard colors from the Architect, submit at least two 12-inch long pieces of major metal extruded components of the systems, and 12 by 12 inch samples of finished aluminum sheet used for formed brake metal components, prefinished in the specified finish system in selected colors.
7. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required

following initial Green Building Certification Institute (GBCI) review of LEED Application.

- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- e. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.6 QUALIFICATIONS

- A. Installer, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.7 PRE-INSTALLATION CONFERENCE

- A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.

1.8 MOCK-UP

- A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work. Mockup subject to testing under Section 01 43 25 – TESTING AGENCY SERVICES.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Protect pre-finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
- B. Store framing and glazing materials in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install sealant when ambient temperature is less than 40 degrees Fahrenheit.
- B. Maintain this minimum temperature during and 48 hours after installation of sealant.

1.11 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.12 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Do not order or deliver any materials until all submittals, required hereunder, have been received and approved by the Architect.
- C. Arrange keying, and schedule delivery of keys, with Owner.

1.13 WARRANTY

- A. Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 - 1. Manufacturer's written extended warranty for curtainwall systems, covering repair or replacement of any system which leaks, or exhibits defects in materials, finish, design, within 10 years from date of substantial completion of the General Contract. Failure due to defective materials or workmanship is deemed to include, but not to be limited to:
 - a. Failures in operation of operating component or components.
 - b. Leakage or air infiltration in excess of the specified standard.
 - c. Deterioration of finish to an extent visible to the unaided eye.
 - d. Defects which contribute to unsightly appearance, potential safety hazard, or potential untimely failure of the work of this Section or the Work as a whole.
 - 2. Glass manufacturer's standard 10 year guarantee covering insulating glass against defects in materials and workmanship, including failure of seals commencing at date of substantial completion of the General Contract.
 - 3. Finish System Warranty: polyvinylidene fluoride enamel finish 10 year coating warranty assigned specifically to project, covering film integrity (including chipping, crazing, pitting, and delamination), chalk resistance and color fading, color change.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on EFCO Corporation, Monett, MO curtain wall assemblies as specified herein below.
- B. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. EFCO Corp., Monett, MO.
 - 2. Kawneer Manufacturing Company, Norcross GA.
 - 3. Graham Architectural Products Corporation, York, PA".
 - 4. Wausau Metals Corporation, Wausau, WI.
 - 5. United States Aluminum Corporation, Waxahachie TX.

- 6. Vistawall Group (A Division of Oldcastle Glass Engineered Products), Terrell TX.
- C. Sole Source: Manufacturer for the work of this Section shall be same as providing aluminum storefront systems specified under Section 08 43 13 – ALUMINUM-FRAMED STOREFRONTS and aluminum windows specified under Section 08 51 13 – ALUMINUM WINDOWS.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Design, fabricate, assemble and erect curtainwall system, and interfacing conditions with contiguous work, to ensure continuity of building enclosure vapor and air barriers and that all segments of the assemblies will be free from leakage under every condition of weather and exposure. In addition to the specified performance requirements, curtain wall assembly shall conform to, or exceed the requirements of the applicable building code and referenced industry standards for air infiltration, water infiltration, operating forces, deflection and deformation under load.
- B. Engineering criteria: The manufacturer for each curtain wall system shall employ the services of a qualified structural engineer, registered to practice in the Commonwealth of Massachusetts, to prepare all calculations and other performance criteria for the respective systems, and bear all costs therefor. All shop drawings for the metal components of the respective systems shall bear the registration stamp of the engineer.
 - 1. Wind loading: Aluminum curtain wall system 2015 International Building Code (IBC) with Massachusetts Building Code, Ninth Edition amendments (780 CMR):
 - a. Basic Wind Speed: 134 miles per hour. (three-second-gust).
- C. Air infiltration through assembly, tested in accordance with ASTM E283 with a static pressure difference of 6.24 psf, shall not exceed 0.06 cfm per square foot of unit surface area
- D. Water resistance: test in accordance with ASTM E331 at a static air pressure difference of 15.0 psf with result of no water leakage.
- E. Dynamic water resistance: test in accordance with AAMA 501.1 at a static air pressure difference of 15.0 psf with result of no water leakage.
- F. Deflection: test in accordance with ASTM E330 at a static air pressure difference of 31 psf (positive and negative).
 - 1. Deflection of framing members perpendicular to the plane of the wall shall not exceed L/175 of its clear span.
- G. Condensation resistance tests (CRF): conform to AAMA 1503.1 for a minimum CRF of 55, and a maximum conductive thermal transmittance "U-Value" of U_c 0.65.
- H. Entrance doors:
 - 1. Air infiltration through assembly, tested in accordance with ASTM E283 with a static pressure difference of 1.57 psf.

- a. For single doors, air infiltration shall not exceed 0.50 cfm per linear foot of perimeter crack.
- b. For double doors, air infiltration shall not exceed 0.10 cfm per linear foot of perimeter crack.

2.3 FRAMING SYSTEM

- A. Curtain wall framing system: Integrated flush glazed with thermal break and insulated glass. Vertical and horizontal framing members shall have screw spline construction with a nominal face width and total depth as noted on the Drawings.
 1. EFCO product "5600", with "Duracast" fiberglass pressure plates.
 2. Kawneer "1600UT (Ultra-Thermal) Series System 1".
 3. Wausau product "6250 Superwall" with "XLT" composite fiberglass pressure plates.

2.4 MATERIALS

- A. Extruded Aluminum: ANSI/ASTM B221; G.S.10A alloy, T-5 temper.
- B. Sheet Aluminum: ASTM B209; alloy as required for forming and finishing.
- C. Sheet Steel: ANSI/ASTM A446; galvanized.
- D. Steel Sections: ANSI/ASTM A36; shapes to suit mullion sections.

2.5 FRAMING MATERIALS

- A. Provide and install all miscellaneous formed aluminum work in conjunction with the aluminum framework as detailed and as required to complete the work including but not limited to sills, mullion covers, closures, flashings.
- B. Pressure plates shall be custom extruded aluminum pressure plate. Refer to Drawings for sizes and shapes.
- C. Aluminum sections shall be of sizes and profiles indicated on the approved shop drawing details; shall present straight, sharply defined lines and arises; and shall be free from defects impairing strength, durability, or appearance.
- D. Formed flashings and closures shall be of aluminum alloy/temper 5005-H34, minimum of 0.04 inch thick, complying with ASTM B 209.
 1. Provide and install all miscellaneous formed aluminum work in conjunction with the aluminum framework as detailed and as required to complete the work including but not limited to sills, mullion covers, closures, flashings.
- E. Aluminum sections shall be of sizes and profiles indicated on the approved shop drawing details; shall present straight, sharply defined lines and arises; and shall be free from defects impairing strength, durability, or appearance.
- F. System shall provide flush glazing on all sides for the indicated thickness of glass, with no projected glazing stops.
- G. All anchors and fasteners, including screws, nuts, bolts, rivets, and other fastening devices shall be of tempered aluminum or non-magnetic type 302/304 stainless

steel, compatible with the aluminum frame members. All such devices shall be of suitable type and adequate capacity for each intended purpose. The aluminum work shall generally be constructed and erected without use of exposed fasteners. However, where exposed, the fasteners shall be finished to match the finish of surrounding aluminum.

- H. Anchor brackets and fasteners for attachment to structure as designed and located by engineering criteria calculations, finished to match curtain wall.
- I. Structural silicone glazing where indicated on Drawings.
- J. Provide and install stainless steel sill flashing at grade conditions, unpolished 26 gage Type 302/304.

2.6 ENTRANCE DOORS

- A. Aluminum doors shall be thermally broken extruded aluminum, preglazed, single acting, hinged doors, narrow or wide stile-and-rail type. Subject to compliance with the requirements specified herein, products which may be incorporated in the work include, the following or equal:
 - 1. EFCO
 - a. Model "D502 (TS) ThermaStile" door.
 - 2. Kawneer
 - a. Model: "560 Insulclad" door.
 - 3. Oldcastle
 - a. Model "MS-212 Thermal Medium Stile," door. (At Door X13 only, see Drawings)
 - b. Model "MS-500 Thermal Medium Stile," door.
- B. Entrance doors:
 - 1. Wall thickness of stile and rail extrusions: not less than 0.125 inch.
 - 2. Wall thickness of glazing stops: not less than 0.050 inch.
 - 3. Thickness of door: 1-3/4 inches.
 - 4. Width of door stiles: 5 inches minimum (8 inches where indicated on Drawings).
 - 5. Width of top rail: 5 inches minimum.
 - 6. Width of bottom rail: 10 inches minimum (in conformance with 2012 ADA).
 - 7. Fabricate doors with hairline joints at corners of stiles and rails; provide heavy concealed reinforcement brackets secured with screws and welded.

2.7 DOOR HARDWARE

- A. Hardware shall be furnished under Section 08 71 00 - DOOR HARDWARE, unless otherwise indicated to be furnished as part of the work of this Filed Subcontract and installed by aluminum entrance and storefront framing system manufacturer, conforming to governing laws and building codes.
 - 1. Install all reinforcing required and prepare doors for finished hardware specified.

- B. The following hardware shall be furnished and installed by aluminum entrance and storefront framing system manufacturer, conforming to governing laws and building codes. The model numbers specified below are to establish the standards of design and quality, equal products of other manufacturers may be submitted to the Architect for approval, finish shall match doors where possible:
- C. Sill sweep strips: As recommended by the manufacturer.
- D. Threshold: Thermally separated extruded aluminum in mill finish, with anchors and clips, coordinated with pivots and floor-concealed closers.
- E. Weatherstripping: Replaceable compressible neoprene or molded PVC type gaskets or replaceable wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing as suitable for type of door operation.
- F. Thermal separators on doors: Rigid polyvinyl chloride (PVC) extrusions.

2.8 GLASS AND GLAZING MATERIALS, TYPES AND LOCATIONS

- A. Glass types identified in this Section are specified under Section 08 51 13 – ALUMINUM WINDOWS included as part of this Trade Contract.
 - 1. General: For locations of glass types, comply with the following descriptions and refer to Aluminum Frame (Curtain wall and Storefront), Window, and Door Types and Schedules as well as Interior and Exterior Elevations for additional locations, and as additionally noted on Drawings.
- B. Glazing materials, including all sealant, tapes and gaskets, shall be as recommended by the aluminum curtainwall system manufacturer, and shall be in strict accordance with the manufacturer's printed instructions. It shall be the responsibility of the aluminum system manufacturer to provide glazing materials which are appropriate for the various uses and conditions, compatible with each other and also compatible with the materials with which in contact.
 - 1. Continuous cushions beneath all glazing materials: Extruded dense EPDM rubber gaskets (60 +/- Shore A durometer), complying with ASTM C 864.
 - 2. Continuous and recessed spacers: Extruded, closed-cell sponge neoprene or EPDM gaskets (40 +/- 5 Shore A durometer) complying with ASTM C 509.
- C. Provide black hermetic spacers for all insulated glass units.
- D. All tempered glazing units shall be installed with "draw" marks in the same orientation.

2.9 INSULATED METAL PANELS (SYNONYMOUS WITH INSULATED METAL PANELS AND INSULATED COMPOSITE PANELS)

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Mapes Industries, Lincoln, NE, Product: "Mapes-R Insulated Composite Panels".
 - 1. Panels are fabricated with reveal edges designed to be glazed into curtain wall systems.
 - 2. Panel thickness: 1 inch.
 - 3. R-value: 6.43.

4. U-Value: 0.1555.

B. Panel Components:

1. Exterior: High density 3/16 inch tempered hardboard faced with aluminum face having an AAMA 2605 PVDF finish matching curtain wall system.
2. Interior: High density 3/16 inch tempered hardboard faced with aluminum and having a AAMA 2605 PVDF finish matching curtain wall system.
3. Core: 1.7-pound density polyisocyanurate foam insulation

C. Panel fabrication:

1. Tolerances - .8% of panels dimension length and width - (+/-) 1/16" thickness.

2.10 MEMBRANE TRANSITION FLASHING

A. Membrane Transition Flashing:

1. Preformed Silicone-Sealant Extrusion/Transition Strip System:
Manufacturer's standard pre-formed extruded pre-engineered pre-cured, low-modulus silicone-rubber extrusion, sized to fit opening widths, with a single-component, neutral-curing, 40 durometer. Class 100/50 low-modulus) translucent silicone sealant for bonding extrusions to substrates.
 - a. Basis of design: Tremco Commercial Sealants & Waterproofing, Beachwood, OH. Product: "Proglaze ETA, Connections"
 - 1) Width: As required by field conditions
 - 2) Acceptable products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a) Tremco Commercial Sealants & Waterproofing, Beachwood, OH, product: "Proglaze ETA, Connections."
 - b) Dow Corning Corporation, Midland, MI, product: "123 Silicone Seal."
 - c) Pecora Corporation, Harleysville, PA, product: "XL-Span."
 - d) Elbex Corporation, Kent, OH, product "HS 222" (0.30 inch thick).
2. Sealants and primers and recommended by transition flashing manufacturer and compatible with adjacent materials. Provide letters of compatibility from each manufacturer as required.

2.11 ACCESSORIES

- A. Flashing at grade conditions: Unpolished 26 gage Type 316 stainless steel.
- B. Steel Primer: FS TT-P-31; red; brown; for shop application and field touch-up.
- C. Fasteners: All anchors and fasteners, including screws, nuts, bolts, rivets, and other fastening devices shall be of tempered aluminum or non-magnetic type 302/304 stainless steel, warranted by the manufacturer to be non-corrosive and compatible with aluminum frame members and other components of the curtain wall assemblies. All such devices shall be of suitable type and adequate capacity for each intended purpose.

1. Perimeter Anchors: Aluminum or steel that is properly insulated from aluminum.
- D. Shims: "U" shaped structural shims complying with the following:
1. Material: High impact polystyrene, interlocking or non-interlocking to achieve necessary thicknesses.
 2. Sizes: 1-1/2 by 2 inch by 1/16 inch thick, Part No. WS 1060 (blue); 1-1/2 by 2 inch by 1/8 inch thick, Part No. WS 1125 (red); 1/2 by 2 inch by 1/4 inch thick, Part No. WS 1250 (black).
 3. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. AccuTrex Products, Inc. Canansburg, PA.
 - b. Accushim, Lyons, IL.
 - c. Mr. Shims, Villa Park, IL.
- E. Sealant and backer materials:
1. Sealant used within system: As recommended by manufacturer.
 2. Exterior perimeter Sealant: Multi-component gun-grade polyurethane sealant Low modulus type, non-sagging, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type M, Class 25, Grade NS, use NT, M, A and O with a minimum movement capability of ± 50 percent, equal to the following:
 - a. Tremco, Beachwood OH; product "Dymeric 240 / Dymeric 240FC".
 - b. BASF Sonneborn Building Products Inc., Minneapolis MN; product, "Sonolastic NP2".
 - c. Pecora Corporation, Harleysville PA; product "Dynatrol II".
 - d. Sika Corp, Lyndhurst NJ; product, "Sikaflex 2CNS".
 3. Compressible joint bead back-up: Compressible closed cell polyethylene, extruded polyolefin or polyurethane foam rod 1/3 greater in diameter than width of joint. Provide one of the following, or equal.
 - a. Nomaco, Inc., Zebulon NC, product "Foam Pak II".
 - b. Sonneborn Building Products Inc., Minneapolis MN, product "Sonofoam".
 - c. Tremco, Beachwood OH, product "Joint Backing".
 - d. Applied Extrusion Technologies, Inc., Middletown DE, product "Sof Rod".
- F. Structural silicone glazing:
1. Glazing sealant for flushed glazed, capless system
 - a. Structural Flush Glazed Joints: High performance silicone sealant applied in accordance with manufacturer's recommendations.
 - b. Non-structural Flush Glazed Joints and Weather Seal Joints: Silicone sealants applied in accordance with manufacturer's recommendations.
 - c. Structural silicone sealant performance requirements:
 - 1) Hardness: ASTM D2240 Type A, 30 durometer.
 - 2) Ultimate Tensile Strength: ASTM D412, 170 psi.
 - 3) Tensile at 150% Elongation: ASTM D412, 80 psi.

- 4) Joint Movement Capability after 14 Day Cure: ASTM C719, +/- 50%.
 - 5) Peel Strength (aluminum, glass, concrete) after 21 Day Cure: ASTM C794, 50 ppi.
- d. Structural silicone shall not be used to support dead weight of vertical glass or panels.

2.12 FABRICATION

- A. Check dimensions of openings for curtain wall systems in the actual construction by accurate field measurement before fabrication. When necessary to proceed with the fabrication without field measurements, coordinate and control installation tolerances to ensure proper fit of the aluminum curtain wall systems.
- B. Before shipment, complete fabrication, assembly, finishing, and other work to the greatest extent possible. Disassemble only for shipment and installation.
- C. Perform fabrication, including cutting, fitting, forming, drilling and grinding to prevent damage to exposed finish surfaces.
- D. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.
- E. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator.
- F. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- G. Notch mullion screw raceways at perimeter to accept self-adhered membrane transition flashing connection to AVB flashings.

2.13 EXTRUDED AND FORMED SHEET METAL ALUMINUM BRAKE METAL WORK

- A. Fabricate and install all extruded aluminum and formed sheet aluminum brake-metal work in conjunction with the aluminum curtain wall work as detailed and as reasonably required to complete the work including sill extensions, snap trim pieces, closures, coverings, flashings and other miscellaneous extruded and formed brake-metal work in conjunction with Work of this Section.
 1. Provide extruded shapes wherever possible, reserving formed work for conditions where extrusions are not applicable.
 2. Provide sheet metal panning not less than 0.060 inch thick.
 3. Fasten trim clips, at not more than 16 inches on center.
 4. .063 aluminum infill as detailed behind insulated metal panel.
- B. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent "oil canning" or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.

2.14 FINISHES

- A. Aluminum finish: Shop-applied, fully oven cured Polyvinylidene Flouride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), NAAMM - Metal Finishes Manual, and the following:
1. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
 2. Finish Coating shall be manufactured as one of the following products:
 - a. Glidden Company; product "Visulure."
 - b. Morton International; product "Fluoroceram CL."
 - c. PPG Industries Inc.; product "Duranar XL."
 - d. Valspar Corp., product: "Flurothane."
 3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
 4. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
 5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
 6. Finish Coat (Color Coat): Polyvinylidene flouride enamel averaging 0.70 to 0.80 mil dry film thickness.
 7. Top Coat: Polyvinylidene flouride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
 8. Color and Appearance: Provide custom colors as provided by Architect including colors designated by the coating manufacturer as "bright," "premium," "pearlescent," or "metallic". Colors shall be in configuration approved by the Architect, separate colors for exteriors and interiors of curtain wall may be selected.
 - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.
- B. Exposed to view clips, fasteners: Finished to match curtain wall system.
- C. Concealed Steel Items: Galvanized in accordance with ASTM A386 to 2.0 ounces per square foot.
- D. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.
- E. All clips and fasteners exposed to view shall be finished to match curtainwall system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of existing project conditions.
- C. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.
- D. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

3.2 ERECTION

- A. Coordinate the installation of the curtain wall systems, and related items to be furnished hereunder with the work of the other trades responsible for providing receiving and interfacing materials, and ensure that all receiving and supporting surfaces have been completed and ready to receive the work of this Section.
- B. Perform the installation work in strict accordance with the approved shop drawings, and the manufacturers' installation instructions, the applicable provisions of AAMA Aluminum Curtain Wall Design Guide Manual, and referenced standards. Erect the various systems and items plumb and true, in proper alignment and relation to established lines and grades.
- C. All shims shall be aluminum. Wood shims will not be acceptable.
- D. Provide sheet aluminum closures as indicated or required to complete the Work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install and set thresholds in bed of water caulk mastic and secure.
- G. Perform all glazing work in accordance with FGMA Glazing Manual SIGMA and LSGA standards, and with the curtain wall system manufacturers' recommended glazing procedures.
- H. All glass at frames shall be set by use of resilient glazing gaskets between both interior and exterior stops and glass, weathertight, in strict accordance with the printed glazing instructions of the manufacturers of aluminum work and glazing materials.
- I. Ensure that all metal-to-metal and metal-to-glass joints are completely weathertight, and that adequate provisions have been made to permit expansion and contraction in the metal.
- J. No permanent exposed to view labels of any kind will be permitted to remain on the frames or glass.

- K. Perform curtain wall mullion gunsight/stem removal and preparation to receive transition membrane.

3.3 GLAZING

- A. Field glaze in accordance with FGMA Glazing Manual SIGMA and LSGA standards for glazing and installation methods and with the entrance/storefront framing system manufacturers' recommended glazing procedures. Do not glaze when ambient temperature is below 40 degrees Fahrenheit. Additionally:
 - 1. All tempered glass units shall be installed with draw marks oriented in the same direction.
 - 2. Prior to installing glass, clean glazing channels and framing members.
 - 3. Remove coatings not completely bonded to substrates.
 - 4. Remove lacquer from metal surfaces where in contact with glazing sealant.
 - 5. Protect glass from edge damage at all times. Utilize roller blocks and suction cups.
 - 6. Replace glass from edge damage or other imperfections which would weaken glass.
 - 7. Install setting and side blocks in locations recommended by referenced standards.
 - 8. Center glass in openings. Provide minimum bite and clearances as recommended by referenced standards. Install in manner to permit easy replacement of glass without dismantling frames.
 - 9. Prevent metal to glass contact at all locations. Protect edges of insulated units from moisture and solvents.
 - 10. Clean, prime and install stops.
- B. Glaze curtainwall system by use of resilient glazing gaskets between both interior and exterior stops and glass, weathertight, in strict accordance with the printed glazing instructions of the manufacturers of aluminum work and glazing materials.
- C. Ensure that all metal-to-metal and metal-to-glass joints are completely weathertight, and that adequate provisions have been made to permit expansion and contraction in the metal.
- D. Upon completion of the installation, thoroughly clean and polish all surfaces. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces.

3.4 TOLERANCES

- A. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities. Erect the aluminum systems plumb and level, free of warp or twist.
 - 1. Install 1/16 inch per 10 feet, non cumulative, maximum variation from plumb.
 - 2. Install 1/32 inch maximum misalignment of two adjoining members abutting in plane.

3.5 PROTECTION AND CLEANING OF CURTAIN WALL SYSTEM

- A. Clean all curtain wall system promptly after installation, exercising care to avoid damage. Thoroughly clean all metal and glass surfaces free from dirt, handling marks, packing tapes, and foreign matter; remove excess sealant. Remove labels from glass surfaces, and clean and polish same.
- B. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces with shop-coat finish material, supplied with the various items to be furnished hereunder.
- C. The manufacturer shall advise the Contractor of protective treatment and other precautions required by him through the remainder of construction to ensure that the work of this Section will be without damage or deterioration at the time of Substantial Completion of the Contract.

3.6 CLEANING OF GLASS

- A. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess sealing compounds, mortar, paint, dirt, and other contaminants.
- B. All exposed edges of sealant and gaskets shall be left smooth, uniform in line, and with edges neatly struck.

3.7 GLASS BREAKAGE

- A. Replace in kind and thickness all glass breakage caused by the work performed under this Section, and bear all costs therefor.
- B. Replace in kind and thickness all glass breakage, caused by other trades, because of negligence or any other reasons, with the costs being borne by the trade at fault, or the Contractor, as applicable.

3.8 PROTECTION

- A. Protect finished metal surfaces from damage during fabrication, shipping, storage, and erection; advise the Contractor of protective treatment and other precautions required through the remainder of construction.

End of Section

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Section 08 45 13
FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Design, fabricate and erect fiberglass-sandwich-panel assemblies including the following:
 - 1. Factory engineered, insulated translucent glass-fiber panel wall systems at gymnasium.
 - 2. Prefinished aluminum flashings related to work of this section with related sealant and backer rod.
 - 3. Full perimeter backer rod and sealant at exterior and interior frame to air barrier locations

1.2 RELATED SECTIONS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 05 12 00 - STRUCTURAL STEEL: Structural framing.
- F. Section 05 40 00 – COLD FORMED METAL FRAMING: Cold formed metal wall framing.
- G. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and curb.
- H. Section 07 27 13 - MODIFIED BITUMINOUS SHEET AIR BARRIER: Flexible membrane flashing.
- I. Section 07 92 00 - JOINT SEALANTS: Perimeter joint sealant and backer materials.
- J. Section 09 91 00 – PAINTING: Painting perimeter steel framing.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AAMA 2604 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder. Sealant technical data
 2. Provide certification that the manufacturing facilities, sandwich panel components and production sandwich panels have passed annual quality control inspections and testing in conformance with "Acceptance Criteria for Sandwich Panels" as regulated by the Massachusetts State Building Code or equivalent.
 3. Test reports: Provide certified test reports, made by recognized independent testing organizations, shall verify that the completed panels will meet the performance criteria as specified hereinafter.
 4. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.
 5. Shop drawings: Include 1/4 inch scale elevations and plans of canopy, skylight and wall panel systems. Include large scale design details showing attachment clips and brackets, expansion and contraction joint details, flashing details; weep and drainage details, and complete installation details, including field welding, and large scale details.
 - a. Drawings must bear seal and signature of same registered professional engineer licensed in the Commonwealth of Massachusetts responsible for calculations, and preparation of submittal.
 - b. Indicate on shop drawings, system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; panel opening sizes; anticipated deflection under load; affected related work; expansion and contraction joint locations
 - c. Indicate pertinent dimensioning, general construction, component connections and locations, anchorage, methods of joining, and details of all field connections.
 - d. Indicate material, metal thickness, metal finishes, glazing seals and sealant application, glass thickness, all surrounding conditions, and all pertinent information.
 - e. Provide plans, including spotting plans for preset inserts, elevations, sections, full size details and complete installation data.
 - f. Provide sealant technical data
 6. Selection samples:
 - a. Sample card indicating Manufacturer's full range of sealant colors available for selection by Architect.
 - b. Provide samples as requested by Architect for initial selection of panel facing materials.
 7. Verification samples:
 - a. Three samples of insulated-panel assembly, showing typical grid spacing, color and finish of both interior and exterior sheets.

- b. Three 12 inch long samples of each subordinate system components including curbs, mullions, closure caps, and miscellaneous aluminum trim components required for a complete installation.
8. LEED Submittal Requirements:
- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
- 1. Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.
 - 2. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.5 QUALITY ASSURANCE

- A. Installer specializing in applying the work of this Section with a minimum of 5 years experience and authorized by the product manufacturer.
- B. The panel manufacturer shall be a single source of responsibility for the specification, design, layout, fabrication and coordination of the components that constitute the complete panel system.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in a timely manner to maintain continuous erection. Provide wrapping to protect glass-fiber and aluminum surfaces. Do not used adhesive papers which bond when exposed to sunlight or weather.
- B. Store all materials in an level, elevated location, protected from inclement weather and to allow examination by Architect. Store insulated panels on the long edge, elevated above ground, blocked and under cover to prevent warping. Store in sequence to reduce handling so that materials are moved only during initial delivery to site and erection.

1.7 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.9 WARRANTY

- A. Provide 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT
SUBMITTALS: Warranty shall include insulating panels from seal failure and installed assembly from moisture protection.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Kalwall Corporation: Manchester, NH.
- B. Acceptable manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, the following, or approved equal:
 - 1. Kalwall Corporation: Manchester, NH.
 - 2. Major Industries, Wausau, WI.
 - 3. Structures Unlimited, Manchester, NH.

2.2 DESCRIPTION

- A. General Description: Factory fabricated double faced sandwich panel systems for wall, assemblies.
- B. Sustainability Requirements:
 - 1. Aluminum Recycled Content: Minimum 10 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at Contractor's option. Limit use of virgin metal content to the greatest extent possible.

2.3 PERFORMANCE REQUIREMENTS

- A. General: Design, fabricate, assemble and erect fiberglass-sandwich-panel assemblies, and interfacing conditions with contiguous work, to ensure continuity of building enclosure vapor and air barriers and that all segments of the assemblies will be free from leakage under every condition of weather and exposure. In addition to the specified performance requirements, fiberglass-sandwich-panel assemblies shall conform to, or exceed the requirements of the applicable building code and referenced industry standards for air infiltration, water infiltration, operating forces, deflection and deformation under load, including uplift pressure/suction of wind loads.
- B. Engineering criteria: The manufacturer for fiberglass-sandwich-panel assemblies shall employ the services of a qualified structural engineer, registered to practice in the Commonwealth of Massachusetts, to prepare all calculations and other

performance criteria for the respective systems, and bear all costs therefor. All shop drawings for the metal components of the respective systems shall bear the registration stamp of the engineer.

1. Wind loading: Conform to 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments:
 - a. Basic Wind Speed: 134 miles per hour. (three-second-gust).
 2. All load bearing members shall be capable of carrying a minimum of 300 pounds concentrated live load midspan with no permanent deformation or buckling of members or glazing panel breakage.
 3. Refer to Structural Drawing S1.1 for wind loading information
- C. Fiberglass-sandwich-panel assemblies to provide for expansion and contraction within system components caused by a cycling temperature range of 170 Fahrenheit degrees without causing detrimental effects to system or components.
- D. System to accommodate, without damage to the system, system components, or deterioration of perimeter seal: movement with system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.
- E. Not permitted: Vibration harmonics; wind whistles; noises caused by thermal movement; thermal movement transmitted to other building elements; loosening, weakening, or fracturing of attachments or components of system.

2.4 ASSEMBLIES

- A. Wall Systems at Gymnasium, shall have the following characteristics:
1. Panel thickness: 2-3/4 inch (70 mm).
 2. Panel internal grid pattern: nominal 12 by 24 inches, regular pattern (shoji pattern) and symmetrical about the horizontal center line of each panel.
 3. Translucent facings:
 - a. Interior face sheet: Impact-Resistant Type.
 - 1) Thickness: 0.045.
 - 2) Texture: Smooth
 - 3) Color: White
 - b. Exterior Face Sheet:
 - 1) Thickness: 0.070.
 - 2) Texture: Smooth
 - 3) Color: Crystal
 4. Light transmittance factor: 13 percent.
 5. Solar Heat Gain Coefficient (SHGC):0.18 (NFRC 201 certified).
 6. Thermal Performance:
 - a. Panel U-value: 0.14
 - b. System U-value: 0.20

2.5 COMPONENTS

- A. Translucent facing

1. Translucent faces shall be manufactured by insulated system fabricator specially for architectural use.
 - a. Appearance: Uniform in color to prevent splotchy appearance, completely free of ridges and wrinkles which prevent proper surface contact in bonding to aluminum grid core. Clusters of air bubbles/pinholes will not be acceptable.
 - 1) Faces shall not vary more than plus or minus 10 percent in specified thickness.
 - b. Flame spread: Interior face sheet shall have a flame spread rating no greater than 20 and smoke developed no greater than 200 when tested in accordance with UL-723. Burn extent by ASTM D-635 shall be no greater than 1 inch. Faces shall not deform, deflect or drip when subjected to fire or flame; or become detached when subjected to 300 degrees Fahrenheit for 25 minutes.
 2. Facing Weatherability:
 - a. The full thickness of the exterior face shall not change color more than 4.0 CIE/Lab units after five years outdoor South Florida weathering at 45 degrees facing south, determined by the average of at least three white samples to insure maximum, long term color stability.
 - b. The exterior face shall have a permanent glass erosion barrier to provide maximum long term resistance to reinforcing fiber exposure and shall be warranted against same for 20 years. Plastic film overlays are not acceptable as equal.
 - c. The exterior face shall have a permanent glass veil erosion barrier integrally embedded to provide resistance to fiber exposure. Sacrificial plastic surface films, coatings or veils are not acceptable.
 3. Panel strength: Exterior face sheet shall be high strength type, uniform in strength and repel an impact equal to 230 foot-pounds without fracture or tear when impacted by a 3-1/2 inch diameter 6.37 pound free falling ball.
- B. Panel Core:
1. Aluminum I-beams: Full 2 inch thermally broken fabricated from minimum 6063-T6alloy, with provisions for mechanical interlocking of muntin-mullion and perimeter to prevent high and low intersections which do not allow full bonding surface to contact with face material. Poured and de-bridged thermal breaks and /or cutout voids will not be accepted. Width of I-beam shall be no less than 7/16 inch. I-beam grid shall be machined to tolerances of not greater than $\pm .002$ inch for flat panels.
 - a. Thermally broken composite grid core shall have a minimum Condensation Resistance Factor of 80 by AAMA 1503.
- C. Panel Adhesive:
1. Laminating adhesive shall be rubber-nitril-phenolic based adhesive engineered specifically for structural sandwich panel use. Adhesive shall pass testing requirement specified by the International Conference of Building Officials "Acceptance Criteria for Sandwich Panel Adhesive" and have the following qualities.
 - a. Minimum tensile strength: 750 PSI by ASTM C 297 after two exposures to six cycles each of the aging conditions prescribed by ASTM D 1037.

- b. Minimum shear strength average of five exposures by ASTM D 1002:
 - 1) 540 PSI at 50 percent relative humidity at 73 degrees Fahrenheit.
 - 2) 700 PSI at accelerated aging by ASTM D 1183.
 - 3) 60 PSI at 182 degrees Fahrenheit.
 - 4) 715 PSI at Full Cycle soak.
 - 5) 1400 PSI at 500 hour oxygen bomb.

D. Battens And Perimeter Closure Systems

- 1. Extruded 6063-T6 and 6063-T5 aluminum screw clamp-tite closure system.
- 2. Aluminum closures to be supplied with 300 series stainless steel screws (excluding final fasteners to the building and shall be factory sealed to the panels. Aluminum battens and cap plates shall be field installed.

2.6 FABRICATION

- A. Factory preassemble and sealed panels into a bonded sandwich assembly, consisting of flat glass fiber sheets heat and pressure adhered to an interlocking thermally broken aluminum "I-beam" grid core. Tape bond systems are not acceptable as an equal.
- B. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat sharp edge. In order to insure bonding strength, white spots at intersection of muntins and mullions shall not exceed 4 for each 40 square feet of panel, nor shall they be more than 3/64 inch in width.
- C. Translucent sandwich panel deflection shall not exceed 3.5 inches at 35 PSF loading and shall not exceed 0.10 inch set deflection five minutes after load release per ASTM E 72 with a 12 inch clear-span, tested flat.
- D. Provide straight adhesive bonding lines, covering the entire width of internal framing with neat, sharp edges.
- E. Fabricate trim components allowing expansion and contraction for minimum clearance and shim spacing around perimeter of assembly, yet enabling installation. Prepare components to receive anchor devices. Fabricate anchorage items.
- F. Factory assemble and seal panels and aluminum perimeter frame where practical. Rigidly fit and secure joints and corners with screw and spline or internal reinforcement. Make joints and connections flush, hairline, and weatherproof. Arrange fasteners, attachments, and jointing to ensure concealment from view.

2.7 ACCESSORIES

- A. Battens and Perimeter Closure Systems: As recommended by the manufacturer.
- B. Extruded 6063-T6 and 6063-T5 aluminum screw clamp-tite closure system with urethane bridge.
 - 1. Aluminum closures to be supplied with 300 series stainless steel screws (excluding final fasteners to the building and shall be factory sealed to the panels. All perimeter closures to be bed cocked and perimeter seated.
 - 2. All exposed aluminum to be factory finished as specified herein.

- C. Flexible Sealing Tape shall be manufacturer's standard pre-applied to closure system at factory under controlled conditions.
- D. Flexible Sealing Tape shall be manufacturer's standard pre-applied to closure system at factory under controlled conditions.

2.8 FACTORY FINISHING

- A. Shop Applied Polyvinylidene Flouride (PVDF) resin based, high performance thermoplastic organic coating conforming to AAMA A621, NAAMM - Metal Finishes Manual, and the following:
 - 1. Finish Coating shall be manufactured as one of the following products:
 - a. Morton International; product "Fluoroceram".
 - b. PPG Industries Inc.; product "Duranar".
 - c. Valspar Corp., product: "Fluropon".
 - 2. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
 - 3. Prime all surfaces with a corrosion resistant, epoxy-based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness, fully oven-cured.
 - 4. On finished side of coil, provide one color coat, of polyvinylidene flouride enamel averaging 0.7 to 0.8 mil dry film thickness on all exposed surfaces, including all exposed screws, fastenings.
 - a. On reverse side of coil provide off-white washcoat.
 - 5. Top Coat: Polyvinylidene flouride enamel clear topcoat averaging 0.45 to 0.55 mils dry film thickness.
 - 6. Color and Appearance: Provide custom colors as provided by Architect including colors designated by the coating manufacturer as "bright," "premium," "pearlescent," or "metallic". Colors shall be in configuration approved by the Architect.
 - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.
 - 7. Warranty: Coil coating manufacturer's 20 year coating warranty covering film integrity, chalk resistance and color change, assigned to project.
- B. Apply one coat of bituminous coating to concealed aluminum surfaces in contact with dissimilar materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that existing openings, and adjoining air and vapor seal materials are ready to receive the work of this Section. Carefully examine supporting structure and conditions under which Work is to be erected. Immediately notify the Construction Manager and Architect in writing, if the supporting structure is unsatisfactory. Do not proceed with erection until unsatisfactory conditions have been corrected in

manner acceptable to installer. Beginning of installation means installer's acceptance of support structure and site conditions.

3.2 PREPARATION

- A. Coordinate dimensions, tolerance and method of attachment with other work.

3.3 INSTALLATION

- A. Install system in strict accordance with manufacturer's instructions, and approved shop drawings.
- B. Installer shall take precautions not to damage finish on structural support framing and any other abutting materials. Any damage to finishes of port framing or abutting materials shall be repaired to the satisfaction of the Owner at the installer's expense.
- C. Use panel manufacturer's methods of attachment to structure, in accordance with approved shop drawings, permitting sufficient adjustment to accommodate construction tolerances and irregularities.
- D. Provide alignment attachments and shims required to permanently fasten system to building structure.
- E. Align assembly free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- F. Coordinate attachment and seal of air and vapor barrier materials. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside face of panels and heel bead of glazing sealant. Apply bituminous paint to prevent electrolysis reactions, where required and where indicated on the Drawings. Install sill flashings. Clean aluminum components before applying sealant.
- G. Pack mineral wool insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.4 TOLERANCES

- A. Variation from plane: 0.06 inches every three feet maximum or 0.25 inches per 100 feet, whichever is less.
- B. Misalignment of two adjoining members abutting in plane: 0.015 inches.

3.5 CLEANING

- A. Upon completion of the work prior to final cleaning, remove protective wrapping from glass fiber and aluminum surfaces.
- B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with a soft, clean wiping cloths. Take care to remove dirt in corners. Rinse and wipe surfaces clean.
- C. Remove excess sealant with solvent acceptable to both sealant manufacturer and panel manufacturer.

3.6 PROTECTION

- A. During the installation of the insulated panel, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair and/or replace any work so damaged and soiled.

End of Section

Section 08 51 13
ALUMINUM WINDOWS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 08 00 05)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 08 00 05 – METAL WINDOWS TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 08 00 05.

1.2 SUMMARY

- A. Furnish and install the following:
1. Prefinished extruded aluminum windows assemblies with fixed and inward opening, side hinged, operating sash including operating hardware, insect screening, and all angles, clips, and other items required to anchor the systems to the building structure.
 2. Prefinished miscellaneous formed aluminum mullion covers, closures, flashings, deflection heads, custom sub-sills, frame fillers, custom window snap trim, custom sills, etc, in conjunction with aluminum windows.
 - a. Flashings as indicated on the Drawings.
 3. Metal to metal sealing of aluminum assemblies.
 4. All glass and glazing materials for aluminum windows, aluminum-framed storefront and glazed aluminum curtain wall,
 - a. Factory install window glazing to the fullest extent possible.
 5. Security screens.
 6. Shimming and fasteners required for installation.
 7. Exterior perimeter sealant to abutting materials.
 8. Sealant and compressible back-up beads between framing members and for perimeter joints air barrier connection to window frame as noted on drawings to receive sealant by this Section.
 9. Mock-up elements for field panel.
 10. Window frame filler at change of direction of frame to allow for continuously backed backer rod and sealant.
 11. Integral steel reinforcing at mullions.
 12. Anti-walk blocks at all vertical glass edges.
 13. Glass and glazing at exterior hollow metal frames with sidelights, transoms and hollow metal doors with vision panels specified in Section 08 11 13 – HOLLOW METAL DOORS AND FRAMES.
- B. Furnish the following items for installation under related sections:

1. Glass and glazing items installed under Section 08 43 13 – ALUMINUM FRAMED STOREFRONTS and Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS.
 2. Project-in side hinged vent windows and security screens installed under Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- G. Section 04 20 00 - UNIT MASONRY: Preparation of adjacent masonry work to receive work of this Section 08 51 13.
- H. Section 05 50 00 - METAL FABRICATIONS: Steel lintels.
- I. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.
- J. Section 07 92 00 - JOINT SEALANTS: Interior perimeter sealant and back-up materials.
- K. Section 08 00 05 – METAL WINDOW TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- L. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.

- M. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Entrance doors, frames, glazing, vestibule and storefront framing as part of this Trade Contract.
- N. Section 08 80 00 - GLAZING: Glazing systems, other than the work described as part of this Trade Contract.
- O. Section 09 91 00 - PAINTING: Field painting of interior surface of infill panel and surfaces.
- P. Section 08 44 13 – ALUMINUM CURTAIN WALLS: Curtain wall framing and glazing as part of this Trade Contract.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 1. AAMA/WDMA/CSA 101/I.S.2/A440-05 - Standard Specifications for windows, doors and unit skylights.
 2. AAMA 607.1 – Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
 3. AAMA 611 – Voluntary Standards for Anodized Architectural Aluminum.
 4. AAMA 1503.1 - Specification for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
 5. ASTM A 167 - Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet, and Strip.
 6. ASTM A 386 - Zinc Coating on Assembled Steel Products.
 7. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 8. ASTM B 221 - Aluminum-alloy Extruded Bar, Rod, Wire, Shape, and Tube.
 9. ASTM C 1036 - Flat Glass.
 10. ASTM C 1048 - Heat-Treated Flat Glass.
 11. ASTM E 283 - Rate of Air Leakage through Exterior Entrance and vestibule, Curtains Walls and Doors.
 12. ASTM E 330 Structural Performance of Exterior Entrance and vestibule, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 13. ASTM E 331 - Test method of Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 14. ASTM E 405 - Wear Testing Rotary Operators for Windows.
 15. ASTM E 546 - Test Method For Frost Point of Sealed Insulating Glass Units.
 16. ASTM E 576 - Test Method for Dew/Frost Point of Sealed Insulating Glass Units in Vertical Position.
 17. ASTM E 773 - Test Method for Seal Durability of Sealed Insulating Glass Units.
 18. ASTM E 774 - Sealed Insulating Glass Units.
 19. ASTM E 2431 – Stress Analysis.

20. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
21. Consumer Product Safety Commission: 16 CFR 1201 - Architectural Glazing Standards and Related Material.
22. FS RR-W-356A - Wire Fabric.
23. GANA – Installation Guidelines for Applied Films.
24. LSGA - Standards Manual.
25. Applicable recommendations and standards of the AA (Aluminum Association), SIGMA (Sealed Insulated Glass Manufacturers Association) and the FGMA (Flat Glass Marketing Association).
26. The Glass Association of North America Installation Guidelines for Applied Films.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Design, fabricate, assemble and erect aluminum windows, and their interfacing conditions with contiguous work, to ensure continuity of building enclosure vapor and air barriers and that all segments of the assemblies will be free from leakage under every condition of weather and exposure. In addition to the specified performance requirements, windows shall conform to, or exceed the requirements of the applicable building code and referenced industry standards for air infiltration, water infiltration, operating forces, deflection and deformation under load.
- B. Engineering criteria: The manufacturer for the window system shall employ the services of a qualified structural engineer, registered to practice in the Commonwealth of Massachusetts, to prepare all calculations and other performance criteria for the respective systems, and bear all costs therefor. All shop drawings for the metal components of the respective systems shall bear the registration stamp of the engineer.
 1. Wind loading: Aluminum window system 2015 International Building Code (IBC) with Massachusetts Building Code, Ninth Edition amendments (780 CMR):
 - a. Basic Wind Speed: 134 miles per hour. (three-second-gust).
- C. Testing Requirements: Provide manufacturer's testing and submit test data showing compliance with specified requirements for size of test units specified, or larger. Demonstrate compliance with specified requirements.
 1. Manufacturer's standard data may be submitted if applicable. Perform specified testing if:
 - a. Manufacturer's standard data is based on window units smaller than those required.
 - b. Manufacturer's standard window units will be or have been modified to meet the specified requirements, including custom hardware, extrusions or other frame and sash components as indicated or specified herein.
 - c. Window units are of custom design.
 2. Test units: Provide window units for testing, fully glazed and assembled.
 3. Test Sequence: Air infiltration testing shall precede water resistance testing.

- D. Side Hinged Windows (including related fixed sash):
1. General: Conform to AAMA/WDMA/CSA 101/I.S.2/A440-08 requirements for minimum performance classification AW100, for air leakage, water drainage, water penetration, uniform structural loading, and further requirements of all of the following.
 2. Test samples:
 - a. Sample configuration: Type D as defined in AAMA 101, Paragraph 2.2.5.5.
 - b. Sample(s) for air infiltration, water penetration and structural tests: Minimum unit size as required by AAMA/WDMA/CSA 101/I.S.2/A440-08.
 - c. Sample(s) for thermal tests: Minimum unit size 4'-0" by 6'-0".
 3. Air infiltration through assembly, tested in accordance with ASTM E283 with a static pressure difference of 6.24 psf.
 - a. For operating sash, closed and locked, air infiltration shall not exceed 0.10 cfm per foot of sash crack length.
 - b. For fixed sash, air infiltration shall not exceed 0.10 cfm per square foot of window unit surface area.
 4. Water resistance: test in accordance with ASTM E331 and ASTM E547 at a static air pressure difference of 15.00 psf with result of no water leakage.
 5. Uniform structural loading: test in accordance with ASTM E330 at a static air pressure difference of 150.0 psf (positive and negative) with result of no water leakage glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, or other damage which would cause the window to be inoperable.
 6. Condensation resistance tests (CRF): conform to AAMA 1503 for a minimum CRF of 44 (frame).
 7. "U" Value Tests: (Co-efficient of Heat Transfer): Thermal Transmittance of Conduction with a 15 mph perpendicular dynamic wind: 0.63 BTU/hr/ft²/F with clear-clear glass and 0.52 BTU/hr/ft²/F using clear-Low E insulating glass. (0.44 BTU/hr/ft²/F in triple glazed)
 8. Forced entry resistance: Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 10.

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: for each window assembly type: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder, including glass, window hardware and finish system.
 2. Manufacturer's test data showing compliance with all specified performance requirements. Data shall be based on testing of windows units sized not less than those specified under the Article "Performance Requirements".
Additionally:
 3. Manufacturer's installation instructions, indicate special precautions required.

4. Provide copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof. Additionally include the following:
 - a. Glass manufacturer's standard 10 year guarantee covering insulating glass.
 5. Shop drawings:
 - a. 1/4 inch scale elevations of each window.
 - b. Large scale design details of each window type; indicating sizes, types, and gauges of all metal components; glazing details, indicating types and thickness of glass; bracing and stabilizing members; attachment clips and brackets; and complete installation details;
 - c. Furnish all details bearing dimensions of actual measurements taken at the project.
 6. Selection Samples:
 - a. Color samples: Architect to select custom color including colors designated by coating manufacturer as "premium" or "metallic". Up to two colors may be selected Architect to provide color samples.
 - b. Provide physical samples as requested by Architect for initial selection of colors and finishes.
 - c. Manufacturer's sample boards for sealant colors, for selections by the Architect.
 7. Verification samples:
 - a. After receipt of selected colors from the Architect, submit 12 inch long pieces of window framing components, prefinished in the specified finish system in each selected color.
 - b. Submit two samples of operating hardware.
 8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- B. Submit manufacturer's warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1.7 QUALITY ASSURANCE

- A. The aluminum window assemblies shall be by a single recognized manufacturer specializing in and regularly engaged in, the production of aluminum work of type and quality specified. The design and details as shown on the drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.
- B. Perform work in accordance with AAMA 101.
- C. Sole Source: Manufacturer for the work of this Section shall be same as providing aluminum storefront systems specified under Section 08 43 13 – ALUMINUM-FRAMED STOREFRONTS and glazed aluminum curtain wall specified under Section 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS.

1.8 MOCK-UP

- A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work. Mockup subject to testing under Section 01 43 25 – TESTING AGENCY SERVICES.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Protect pre-finished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
- B. Store framing and glazing materials in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- C. Sequence fabrication and deliveries to avoid delays in construction schedule, and to minimize time of on-site storage.

1.10 ENVIRONMENTAL CONDITIONS

- A. Do not install sealant when ambient temperature is less than 40 degrees Fahrenheit.
- B. Maintain this minimum temperature during and after installation of sealant.

1.11 FIELD MEASUREMENTS

- A. Wherever practicable, check dimensions of openings in the actual framing work, by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress as directed by the Contractor. When necessary to proceed with the fabrication without field measurements, coordinate and control installation tolerances to ensure proper fit of the work of this Section.
- B. Verify that field measurements are as indicated on approved shop drawings.

1.12 SEQUENCING AND SCHEDULING

- A. Coordinate work of this Section with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

1.13 WARRANTY

- A. Provide the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Total window assemblies: Manufacturer's written warranty for aluminum windows, covering repair or replacement of any unit which leaks, or exhibits defects in materials, finish, design, for a period of 10 years from date of substantial completion of the General Contract.
 - 2. Insulating glass: Glass manufacturer's 10 year written warranty covering insulating glass against defects in materials and workmanship, including failure of seals effective on date of original factory shipment to site.
 - a. Provide coverage in manufacturer's Guarantee for manufacturing defects, including failure of hermetic seal of air space (except by glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating or other visual indications of seal failure or performance.
 - b. Guarantee shall include replacement of defective glass and delivery of replacement glass furnished f.o.b. from point of manufacturer to project site.
 - 3. Laminated glass: Manufacturer's 4 year written guarantee covering against defects in materials and workmanship of laminated glass and replacement of the same.
 - a. Provide coverage in Guarantee for manufacturing defects, including failure of laminated glass units as evidenced by edge separation, delamination, or discoloration of inner layer.
 - 4. Insulating Glass: Manufacturer's 10 year written guarantee covering insulating glass against defects in materials and workmanship, including failure of seals effective on date of original factory shipment to site.
 - a. Provide coverage in Guarantee for manufacturing defects, including failure of hermetic seal of air space (except by glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating or other visual indications of seal failure or performance.
 - 5. Finish System Warranty: Polyvinylidene flouride (PVDF) enamel finish 10 year coating warranty assigned specifically to project, covering film integrity (including chipping, crazing, pitting, and delamination), chalk resistance and color fading, color change.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on EFCO (A Division of Pella), Monett MO, Series 325G (3-1/4 inch) windows.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. EFCO (A Division of Pella), Monett MO.
 - 2. Kawneer North America (A Division of Alcoa), Norcross GA.
 - 3. Moduline Windows, Inc. (A Division of Oldcastle Glass Engineered Products), Terrell TX.
 - 4. Wausau Metals Corporation, Wausau WI.

2.2 MATERIALS

- A. All fixed and operable window sections shall be of extruded aluminum. Formed brake metal work shall be of sheet aluminum. Alloys and temper of aluminum shall be as recommended by manufacturer for strength, corrosion resistant, and specified finish, but of not less than 22,000 psi ultimate tensile strength.
- B. Aluminum sections shall be factory prepared extrusions of sizes and profiles indicated on the approved shop drawing details; shall present straight, sharply defined lines and arises; and shall be free from defects impairing strength, durability, or appearance.
- C. Frames specified as thermally-broken shall be equipped with positive, continuous, polyvinyl chloride or polyurethane thermal barrier placed between exterior and interior frame components to the exterior of the glass pane.
 - 1. Frame depth: Calculation of specified frame depths shall not include screen tracks or sill extensions designed to accommodate screens.
- D. Provide custom extruded aluminum sub-frame / sub-sill, end dams, custom snap trim and custom sills.. Finished to match adjacent window construction as selected by the architect. (
- E. Provide manufacturer's standard vinyl frame filler.
- F. All screws, nuts, bolts, rivets and other fastening devices shall be of tempered aluminum or non-magnetic, type 302/304 stainless steel, compatible with the aluminum frame members and other components of the window systems. All such devices shall be of suitable type and adequate capacity for each intended purpose. The aluminum work shall generally be constructed and erected without use of exposed fasteners; where exposed fasteners must be used, the fasteners shall be finished to match the finish of surrounding aluminum.
 - 1. Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.

2. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- G. Sealant for use within the fabricated aluminum frames and for field sealing of the aluminum frame assemblies shall be type guaranteed by manufacturer for the joint size and movement to remain permanently elastic, non-shrinking and non-migrating.
- 2.3 FIXED/CASEMENT WINDOWS
- A. Aluminum:
1. Extruded aluminum shall be 6063-T6 alloy and tempered.
- B. Hardware:
1. Locking handles shall be cam type and manufactured from a white bronze alloy with a US26D brushed finish.
 2. Operating hardware shall be 4-bar stainless steel arms or equal.
- C. Weatherstripping:
1. All weatherstripping shall be Santoprene® or equal.
- D. Thermal Barrier:
1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
 2. The perimeter frame thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions.
 3. The sash and intermediate rails shall be poured and debridged thermal barrier made of two-part polyurethane.
- E. Fabrication:
1. General:
 - a. All aluminum frame and vent extrusions shall have a minimum wall thickness of .125" (3 mm).
 - b. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
 - c. Depth of frame and vent shall not be less than 2" (50 mm).
 2. Frame:
 - a. Frame components shall be mortise and tenon. Other means of mechanically fastening, i.e., screws shall not be permitted.
 3. Ventilator:
 - a. All vent extrusions shall be tubular.
 - b. Each corner shall be mitered, reinforced with an extruded corner key, hydraulically crimped, and "cold welded" with epoxy adhesive.
-

- c. Each vent shall utilize two rows of weather stripping installed in specifically designed dovetail grooves in the extrusion. The exterior gasket will be omitted at the vent bottom rail for project out vents and at the vent top rail for project-in vents, allowing air to pressure equalize the void between the vents and frame.

2.4 ALUMINUM PANNING WORK

- A. Fabricate and install all extruded aluminum and formed sheet aluminum brake-metal work in conjunction with the aluminum window as detailed and as reasonably required to complete the work including sill extensions, snap trim pieces, jamb and sill trim, closures, coverings, flashings and other miscellaneous extruded and formed brake-metal work in conjunction with aluminum windows.
 1. Provide extruded shapes.
 2. Fasten clips as recommended by the manufacturer.
 3. Flashing: 0.040 inch thick aluminum in profiles indicated on the Drawings and finished to match window panning.
- B. Protect surfaces from marring when forming work. Provide sufficient material thickness with all necessary concealed reinforcement and anchorage to prevent "oil canning" or deformation of the finished work. Material deemed defective by the architect will be replaced at no cost to the Owner.

2.5 GLASS - GENERAL

- A. General requirements for glass: Of domestic and foreign manufacture, conforming to the referenced standards and with the additional requirements specified herein; factory labeled on each pane stating the strength, type, thickness and quality; with all labels remaining on glass until final cleaning.
 1. Glass thickness shown and heat treatment specified are minimum requirements. Provide glass thickness and heat treatment as required to meet specified performance criteria, State and local codes and ordinances.
- B. Insulated Glass Units: Conform to Class CBA of Insulating Glass Certification Council (IGCC), with a hermetically sealed dehydrated sealed air space, and tested in accordance with ASTM E 2190.
- C. Heat Strengthened Glass: Comply with ASTM C 1048 HS, heat strengthened, Class 1 clear, quality q3 glazing select.
- D. Tempered Glass: Comply with ASTM C 1048 FT, fully tempered, Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1.
 1. Heat Soaking of Tempered Glass: Provide "heat checking" of the following tempered glass prior to delivery to job site. Provide documentation and test results of "heat checking" process.
 - a. Heat check all monolithic greater than 8 mm (5/16 inch) in thickness.

2.6 GLASS AND GLAZING MATERIALS

- A. Glass manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Guardian Industries, Auburn Hill, MI, product "SunGuard Super Neutral 68", product number SN 68 and IS 20 #4 (Basis of Design).
 2. Viracon, Owatonna, MN, product "VE1-2M Roomside Low-E".
 3. Vitro Architectural Glass, Cheswick, PA., product "Solarban 60 Solar Control Low-E Glass/Sungate 600".
- B. Glass shall be of thickness and types scheduled in the Drawings and comply with the following:
1. General requirements for glass: Of domestic manufacture, conforming to the referenced standards and with the additional requirements specified herein; factory labeled on each pane stating the strength, type, thickness and quality; with all labels remaining on glass until final cleaning.
 2. Fabricate glass as required to openings with edge clearances and bite on glass as recommended by the manufacturer with clean-cut edges where concealed, and smooth-ground, polished and seamed edges where exposed to view. Do not cut, seam, nip or abrade glass after heat-tempering.
 3. Glass thickness shown are minimum requirements. Provide glass thickness and heat treatment as required to meet specified performance criteria, State and local codes and ordinances.
 4. All insulating glass shall consists of two thickness of glass separated by a hermetically sealed dehydrated sealed air space complying with ASTM E 774-88 and conforming to Class CBA of Insulating Glass Certification Council.
 - a. Provide all insulated glass for aluminum windows, aluminum-framed storefront and glazed aluminum curtain wall with black spacer bars as approved by the Architect.
- C. Glazing sealant: One-part high modulus clear silicone sealant, having a useful life expectancy of at least 30 years, GE Silglaze N, Dow-Corning 795 Silicone Building Sealant, Tremco Spectrem 2, or equal.
- D. Compressible foam rod: Polyethylene foam rod, with bond-breaker surface, non gassing, fully compatible with silicone sealant, of appropriate sizes as recommended by the sealant manufacturer for the specific applications.
- E. All sash shall be inside glazed with removable glazing stops. Wrap-around marine glazed sash which require sash disassembly for re-glazing will not be acceptable at single or double hung locations.

2.7 GLASS TYPES AND LOCATIONS

- A. Insulated Glass Type 1: Nominal 1 inch thick insulated "Low-E" glass units:
1. Components:
 - a. Outboard layer: 1/4 inch (6mm) clear heat-strengthened glass, with Low-E sputter coating on number 2 surface.
 - b. Air space: 1/2 inch thick.
 - 1) Gas fill: 90% Argon/10% Air.
 - c. Inboard layer: 1/4 inch (6mm) clear heat-strengthened glass.
 2. Performance Requirements: To establish a standard of quality, design and function desired, Drawings and specifications have been based Guardian

“SunGuard SuperNeutral 68 (SN 68) having the following performance characteristics:

- a. Visible Light Transmittance: 68 percent
 - b. Visible Light Reflectance Outdoors: 11 percent
 - c. Direct Solar Energy Transmittance: 33 percent
 - d. Direct Solar Energy Reflectance Outdoors: 33 percent
 - e. Winter U-Value Nighttime: 0.25
 - f. Summer U-Value Daytime: 0.23
 - g. Solar Heat Gain Coefficient: 0.38
 - h. Summer Relative Heat Gain: 90
3. Locations: Typical at exterior curtain wall and aluminum windows unless noted otherwise. Refer to Drawings for additional notes.

B. Insulated Glass Type 1A: Nominal 1 inch thick insulated “Low-E” glass units:

1. Components:
 - a. Outboard layer: 1/4 inch (6mm) clear heat-strengthened glass, with solid color ceramic frit on number 2 surface.
 - b. Air space: 1/2 inch thick.
 - 1) Gas fill: 90% Argon/10% Air.
 - c. Inboard layer: 1/4 inch (6mm) clear heat-strengthened glass.

C. Insulated Glass Type 1B: Nominal 1 inch thick insulated “Low-E” tempered safety glass units:

1. Components:
 - a. Outboard layer: 1/4 inch (6mm) clear fully-tempered glass, with Low-E sputter coating on number 2 surface.
 - b. Air space: 1/2 inch (9.5 mm) thick.
 - 1) Gas fill: 90% Argon/10% Air.
 - c. Inboard layer: 1/4 inch (6mm) clear fully-tempered glass
2. Performance Requirements: Same as Glass Type 1.
3. Locations: Typical at exterior curtain wall and aluminum windows unless noted otherwise. Refer to Drawings for additional notes.

D. Insulated Glass Type 2: Nominal 1 inch thick insulated “Low-E” glass units:

1. Components:
 - a. Outboard layer: 1/4 inch (6mm) clear heat-strengthened glass, with Low-E sputter coating on number 2 surface.
 - b. Air space : 1/2 inch (9.5 mm) thick.
 - 1) Gas fill: 90% Argon/10% Air.
 - c. Inboard layer: 1/4 inch (6mm) clear heat-strengthened glass, with SunGuard IS 20 coating, on number 4 surface.
2. Performance Requirements: To establish a standard of quality, design and function desired, Drawings and specifications have been based Guardian

“SunGuard SuperNeutral 68 (SN 68) having the following performance characteristics:

- a. Visible Light Transmittance: 68 percent
- b. Visible Light Reflectance Outdoors: 11 percent
- c. Direct Solar Energy Transmittance: 33 percent
- d. Direct Solar Energy Reflectance Outdoors: 33 percent
- e. Winter U-Value Nighttime: 0.25
- f. Summer U-Value Daytime: 0.23
- g. Solar Heat Gain Coefficient: 0.38
- h. Summer Relative Heat Gain: 90

3. Locations: Refer to Drawings for locations.

E. Insulated Glass Type 2B: Nominal 1 inch thick insulated “Low-E” glass units:

1. Components:

- a. Outboard layer: 1/4 inch (6mm) clear tempered glass, with Low-E sputter coating on number 2 surface.
- b. Air space : 1/2 inch (9.5 mm) thick.
 - 1) Gas fill: 90% Argon/10% Air.
- c. Inboard layer: 1/4 inch (6mm) clear tempered glass, with Sunguard IS 20 glazing coating, on number 4 surface.

2. Performance Requirements: Same as Glass Type 2A

3. Locations: Refer to Drawings for locations.

F. Insulated Glass Type 2C: Nominal 1 inch thick insulated “Low-E” glass units:

1. Components:

- a. Outboard layer: 1/4 inch (6mm) clear heat-strengthened glass, with Low-E sputter coating on number 2 surface.
- b. Air space : 1/2 inch (9.5 mm) thick.
 - 1) Gas fill: 90% Argon/10% Air.
- c. Inboard layer: 1/4 inch (6mm) clear heat-strengthened glass, with Sunguard coating, on number 4 surface.

2. Performance Requirements: To establish a standard of quality, design and function desired, Drawings and specifications have been based Guardian “PPG SolarBronze having the following performance characteristics:

- a. Visible Light Transmittance: 68 percent
- b. Visible Light Reflectance Outdoors: 11 percent
- c. Direct Solar Energy Transmittance: 33 percent
- d. Direct Solar Energy Reflectance Outdoors: 33 percent
- e. Winter U-Value Nighttime: 0.25
- f. Summer U-Value Daytime: 0.23
- g. Solar Heat Gain Coefficient: 0.38
- h. Summer Relative Heat Gain: 90

3. Locations: As located on curtain wall and storefront ribbon types sheets - Media Center - CW1, CW1A, CW1B, CW1C, CW1D and Storefront Ribbon Types - SR1, SR1A, SR2, SR3, SR3A. Refer to Drawings for additional notes.
- G. Glass Type 3: Fully tempered safety glass, 1/4 inch (6 mm) thick, clear.
- H. Glass Type 4: Fully tempered safety glass, 3/8 inch (9 mm) thick, clear.
- I. Glass Type 5: Fully tempered safety glass, 1/2 inch (12 mm) thick, clear.
- J. Provide black hermetic spacers for all insulated glass units.
- K. All tempered glazing units shall be installed with "draw" marks in the same orientation.

2.8 SECURITY SCREENS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Kane Manufacturing Corporation, Kane, PA.
 2. Keystone Industries, New Castle, PA.
 3. Rusco N.S. Ltd., Ontario, CN.
- B. Performance Requirements:
 1. General: Provide screen systems that comply with performance requirements specified herein and as determined by testing of representative standard assemblies. Screens shall be Level 4 Medium classification.
 2. Design Requirements: Comply with structural performance as specified.
 3. Test Requirements: Comply with test criteria of SMA 6001-2002.
 - a. Impact Test: An impact of 50 ft/lbs of force causing a deflection of not more than 3 inches as required for medium rating.
 - b. Sag Test: 90 lbs of weight applied for 5 minutes with permanent sag of not more than 0.063" as required for medium rating.
 - c. Forced Entry Test: Three loads of force: Fifty (50), One Hundred Fifty (150) and Three Hundred (300) pounds applied to screen as required for medium rating.
- C. Materials:
 1. Aluminum Extrusions: All frame and retainer sections shall be extruded aluminum shapes fabricated from commercial quality 6063- T5 alloy and shall be free from defects that impair structural capacity and durability.
 2. Sub-frame: All sub-frame members shall be fabricated from extruded aluminum alloy with a nominal wall thickness of .062 inch incorporating an aluminum snap-on cover to conceal installation fasteners. All frame comers shall be miter cut and crimped.
 3. Hinges: A minimum of two hinges shall be located at each jamb opposite the operating mechanisms. Hinges shall fit in an aluminum raceway that allows for removal of any hinge or addition of hinges without the need for processing to

the sub-frame or screen. All hinges shall be pre-assembled three wing design made of aluminum with nylon bushings. Pins, pressure plates and screws shall be stainless steel. Grub screws shall allow removal of pin, grub screw shall only be accessible once the screen is opened.

4. Screens: Screens to be full configuration and operable. The main screen frame shall be mitered construction with a noise reduction gasket preventing rattle between main frame and sub-frame. Frame members and tie bar to have a hollow extrusion, with a .078 inch nominal wall thickness. No exposed fasteners to the interior or exterior will be acceptable. Screens to lock in a closed secure position by means of a single point release lock.
5. Mesh: Stainless steel wire cloth, 12 mesh (0.028 inch diameter), shop finished in custom color as selected by the Architect.
6. Locking Mechanism: Multi-point locking to secure the sash at several points along the sub frame with single point release. Provide single handle at interior that activates a cast metal bolt at the sill and a two directional metal lock and keeper, mid span of the upper lite.
7. Limit Device: An adjustable arm made of galvanized steel shall be located at the head to limit the screen from swinging open past 90° from the manufacturer, field adjustment shall be possible to accommodate existing conditions.

D. Fabrication:

1. Frame members to be mitered and mechanically fastened by means of hydraulically crimped corners utilizing metal corner gussets that allow passage for internal cold welding around the screen frame perimeter.
2. Tie-bar to be coped to fit tightly within frame at each end and attached with mechanical gussets.
3. Screen mesh to be held in place with extruded retainers fastened through the mesh into the frame with tamper proof No. 10 zinc-coated stainless steel screws a minimum of every 4 inches. Retainers shall have a minimal wall thickness of .062 inch and contain a cover plate that conceals all fasteners. Retainer and cover shall match mesh color.
4. Locks shall be factory installed and shipped as part of the complete screen unit.

E. Security screen Finish: Shop-applied Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating applied over a five-stage aluminum pre-treatment, warranted for five years against blistering, peeling or corrosion and conforming to AAMA 2604, NAAMM - Metal Finishes Manual, and the following:

1. Resin base of 50 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
2. Finish Coating shall be manufactured as one of the following products:
 - a. Akzo Chemical; product "Trinar".
 - b. Glidden Company; product "Nubelar."
 - c. Morton International; product "Fluoroceram."
 - d. PPG Industries Inc.; product "Duramar."
 - e. Valspar Corp., product: "Fluropon."

3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
4. Shop-prime all surfaces with a corrosion resistant, epoxy-based primer compatible with finish coating, averaging 1.0 to 1.3 mils dry film thickness, fully oven-cured.
5. Shop finish with one color coat, of polyvinylidene fluoride enamel averaging 1.0 to 1.3 mil dry film thickness on all exposed surfaces, including all exposed screws, fastenings, etc.
6. Color and Appearance: Provide custom colors as provided by Architect including colors designated by the coating manufacturer as "bright," "premium," "pearlescent," or "metallic". Colors shall be in configuration approved by the Architect.
 - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.

2.9 ACCESSORIES

- A. Sealant stop trim: Provide manufacturer's standard sealant stop trim at exterior perimeter of all window frames/trim.
- B. All anchors and fasteners, including screws, nuts, bolts, rivets, and other fastening devices shall be of tempered aluminum or non-magnetic type 302/304 stainless steel, warranted by the manufacturer to be non-corrosive and compatible with aluminum frame members and other components of the window assemblies. All such devices shall be of suitable type and adequate capacity for each intended purpose.
 1. Finished aluminum work shall generally be without use of exposed fasteners. Provide exposed fasteners only where acceptable to Architect, finish to match surrounding aluminum.
 2. For application of hardware, use fasteners that match finish of framing/sash member or hardware being fastened, as appropriate.
 3. Provide anchorage at location and spacing recommended by window manufacturer to comply with specified performance criteria.
 4. Shims: Provide non-organic, non corrosive fully concealed shims as required to level and plumb window assemblies. Locate shims where recommended by window manufacturer.
- C. Shims: "U" shaped structural shims complying with the following:
 1. Material: High impact polystyrene, interlocking or non-interlocking to achieve necessary thicknesses.
 2. Sizes: 1-1/2 by 2 inch by 1/16 inch thick, Part No. WS 1060 (blue); 1-1/2 by 2 inch by 1/8 inch thick, Part No. WS 1125 (red); 1/2 by 2 inch by 1/4 inch thick, Part No. WS 1250 (black).
 3. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. AccuTrex Products, Inc. Canonsburg, PA.
 - b. Accushim, Lyons, IL.

c. Mr. Shims, Villa Park, IL.

D. Sealant and backer Materials

1. Sealant used within system: As recommended by manufacturer.
2. Perimeter Sealant: Joint Sealer Type SE (Silicone, Exterior construction), One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, FS TT-S-001543A, Type, Class A with a minimum movement capability of +100 percent and -50 percent, equal to the following:
 - a. Dow Corning, product, "790".
 - b. GE Silicones, product, "SCS9000 SilPruf NB".
 - c. Sika, product "Sika Sil-C 990".
 - d. Tremco, product "Spectrem 1".
3. Compressible joint bead back-up: Compressible closed cell polyethylene, extruded polyolefin foam or polyurethane foam rod, 1/3 greater in diameter than width of joint. Provide one of the following, or equal.
 - a. Nomaco, Inc., Zebulon NC, product "Foam Pak II".
 - b. Sonneborn Building Products Inc., Minneapolis MN, product "Sonofoam".
 - c. Tremco, Beachwood OH, product "Joint Backing".
 - d. Applied Extrusion Technologies, Inc., Middletown DE, product "Sof Rod".
4. Primers: Furnish and install joint primers of the types, and to the extent, recommended by the respective sealant manufacturers for the specific joint materials and joint function.
5. Bond-breaker tape, and temporary masking tape: Of types as recommended by the manufacturer of the specific sealant and caulking material used at each application, and completely free from contaminants which would adversely affect the sealant and caulking materials.

E. Sealant used within system (not used for glazing): As recommended by window manufacturer.

F. Custom extruded aluminum sill receptor with end dams, custom window snap trim and sills by window manufacturer. Finish to match adjacent window.

G. Vinyl frame filler by window manufacturer.

2.10 FABRICATION

- A. Fabricate window units sized to properly fit each opening, allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal. Prepare window units ready to receive anchors, and furnished with all operating hardware. Engineer window units to fit the openings required without any cutting or fitting on the job site.
1. Rigidly fit joints and corner. Accurately fit and secure corners tight. Make corner joints flush, hairline, and weatherproof. Seal corner joints with sealant. Ensure that joining method(s) do not discolor or damage finish.
 2. Develop drainage holes with moisture pattern to exterior.
 3. Prepare components to receive anchor devices. Fabricate anchorage items.

4. Permit internal drainage weep holes and channels to migrate moisture to exterior.
 5. Fabricate sub-frame / sub-sill with continuous fastening flange extensions at corners to ensure tight fitting, flush, hairline joints ready to receive transition membrane and sealant. Seal all joints and end dams.
- B. Factory glaze to the greatest extent possible. "Wet-Glaze" work in accordance with FGMA Glazing Manual SIGMA and LSGA standards for glazing and installations methods. Additionally:
1. Prior to installing glass, clean glazing channels and framing members.
 2. Remove coatings not completely bonded to substrates.
 3. Remove lacquer from metal surfaces where in contact with glazing sealant.
 4. Protect glass from edge damage at all times. Utilize roller blocks and suction cups.
 5. Replace glass from edge damage or other imperfections which would weaken glass.
 6. Install setting and side blocks in locations recommended by referenced standards.
 7. Center glass in openings. Provide minimum bite and clearances as recommended by referenced standards. Install in manner to permit easy replacement of glass without dismantling frames.
 8. Prevent metal to glass contact at all locations. Protect edges of insulated units from moisture and solvents.
 9. Clean, prime and install stops.
- C. Assemble insect screens of rolled aluminum rectangular sections. Miter and reinforce frame corners. Fit mesh taut into frame and secure. Fit frame with four spring loaded steel pin retainers.
- D. Double weatherstrip operable units.

2.11 FINISHES

- A. Aluminum finish: Shop-applied, fully oven cured Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), NAAMM - Metal Finishes Manual, and the following:
1. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
 2. Finish Coating shall be manufactured as one of the following products:
 - a. Glidden Company; product "Visulure."
 - b. Morton International; product "Fluoroceram CL."
 - c. PPG Industries Inc.; product "Duramar XL."
 - d. Valspar Corp., product: "Flurothane."
 3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.

4. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
 5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
 6. Finish Coat (Color Coat): Polyvinylidene flouride enamel averaging 0.70 to 0.80 mil dry film thickness.
 7. Top Coat: Polyvinylidene flouride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
 8. Color and Appearance: Provide custom colors as provided by Architect including colors designated by the coating manufacturer as "bright," "premium," "pearlescent," or "metallic". Colors shall be in configuration approved by the Architect.
 - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.
- B. Concealed Steel Items: Galvanized in accordance with ASTM A386 to 2.0 ounces per square foot.
- C. Isolation coating to cementitious and dissimilar materials: Apply one coat of bituminous paint or other acceptable coating to concealed aluminum surfaces in contact with cementitious and dissimilar materials
- D. Operator: Enameled to color as selected by Architect from manufacturer's standard options.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install aluminum windows in accordance with the manufacturers' installation instructions, and the herein-referenced standards.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align windows plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work.
- D. Install sill and sill end angles.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Provide flashing along perimeter air and vapor barrier materials.

- G. Install operating hardware.
- H. Perform glazing work in accordance with FGMA Glazing Manual SIGMA and LSGA standards for glazing and installations methods.
- I. Ensure that all metal-to-metal and metal-to-glass joints are completely weatherproof, and that adequate provisions have been made to permit expansion and contraction in the metal.
- J. No permanent exposed to view labels of any kind will be permitted to remain on frames or glass.
- K. Install perimeter sealant and backing materials to method required to achieve performance criteria.

3.3 TOLERANCES

- A. Maximum Variation from Level or Plumb: 0.06 inches every 3 feet non-cumulative or 1/16 inch per 10 feet, whichever is less.
 - 1. Do not add this tolerance to other allowable tolerances for related work.

3.4 ADJUSTING

- A. Adjust operable sash and hardware for smooth operation and tight fit of sash. Lubricate hardware and other moving parts.
- B. Touch-up all scratches, abrasions, and other defects in the prefinished metal surfaces with shop-coat finish material, supplied with the various items to be furnished hereunder.

3.5 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- B. Remove excess sealant by solvent acceptable to sealant manufacturer. All exposed edges of sealant and gaskets shall be left smooth, uniform in line, and with edges neatly struck.
- C. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess sealing compounds, mortar, paint, labels, dirt, and other contaminants.
- D. Remove protective material from prefinished aluminum surfaces. Wash down exposed surfaces free of dirt, handling marks, packing tapes, and foreign matter, using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.6 PROTECTION

- A. Protect finished metal surfaces from damage during fabrication, shipping, storage, and erection; advise the Contractor of protective treatment and other precautions required through the remainder of construction.

- B. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free of the glass. Do not apply warning markings directly to the glass.
- C. Cover glass to protect it from activities that might abrade the glass surface.

3.7 GLASS BREAKAGE

- A. Replace in kind and thickness all glass breakage caused by the work performed under this Section 08 51 13, and bear all costs therefore.
- B. Replace in kind and thickness all glass breakage, caused by other trades, because of negligence or any other reasons, with the costs being borne by the trade at fault, or the Contractor, as applicable.

End of Section

Section 08 63 00
METAL-FRAMED SKYLIGHTS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 08 00 05)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 08 00 05 – METAL WINDOWS TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 08 00 05.

1.2 SECTION INCLUDES

- A. Design, fabricate and erect metal framed extruded aluminum skylights including the following:
 - 1. Prefinished aluminum framed glazing system, for locations indicated, including all required integral reinforcing, bracing members, flashing closure trim and related accessories for the framing systems.
 - 2. All glass and glazing materials.
 - 3. Sealant and backing materials.
- B. Furnish and maintain all staging, cranes, lifts and hoists required for the installation of the skylight components.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED SECTIONS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design*

and Construction, LEED BD+C: Schools rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Steel framing system and curb.
- G. Section 05 40 00 - COLD-FORMED METAL FRAMING: Light gage metal framing system.
- H. Section 05 50 00 - METAL FABRICATIONS: Support clips for skylight.
- I. Section 07 62 00 - SHEET METAL FLASHING AND TRIM: Curb flashing.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AAMA 607.1 - Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
 - 2. AAMA 608.1 - Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
 - 3. ASTM A 36 - Structural Steel.
 - 4. ASTM A 123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. ASTM B 209 - Aluminum and Aluminum-Alloy sheet and Plate.
 - 6. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
 - 7. ANSI Z 97.1 - Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
 - 8. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
 - 9. FGMA Glazing Manual, current edition.
 - 10. All applicable federal, state and municipal codes, laws and regulations for skylights and roofing materials.

1.5 PERFORMANCE REQUIREMENTS

- A. Details of metal framing members, indicated on the Contract Drawings, are set forth to establish the general design, only. Actual sizes and gauges of the members, and all supplementary components, shall be as determined by the manufacturer's structural engineer, as required to meet performance criteria specified herein and as required by the 2009 International Building Code with Massachusetts Building Code, Eighth Edition amendments.
- B. Design and size skylight system so that on the projected areas, the completed skylight will carry all component dead loads, plus a minimum 40 pounds per square foot vertical live loading caused by snow and hail. All load bearing members shall be capable of carrying a minimum of 300 pounds concentrated live load midspan

with no permanent deformation or buckling of members or glazing panel breakage. Design system for 22-1/2 pounds per square foot uplift loading from pressure/suction of wind.

- C. Normal-to-plane deflection of members at maximum design load shall be limited to $L/175$ deflection of the span of member. Assume the required outward pressure to be the same value as the inward pressure. All aluminum framing members shall be designed to a safety factor of 1.65 in accordance with Aluminum Association standards.
- D. Parallel-to-glass deflection shall not be greater than 75 percent of glass edge clearances.
- E. Water Penetration: Design, fabricate, erect and glaze the skylight and its connection to other work so as to prevent water penetration.
 - 1. Water penetration is defined as the uncontrolled penetration of water (not including condensation) to the interior of the building through the skylight system.
- F. Movement: System to accommodate, without damage to system, components or deterioration of seals; movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; deflection of structural support framing.

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 - a. Provide sealant technical data.
 - b. Provide glazing technical data.
 - 2. Test reports: Provide certified test reports, made by recognized independent testing organizations, shall verify that the skylight will meet the performance criteria as specified hereinafter.
 - 3. Manufacturer's installation instructions: Indicate special procedures, perimeter conditions and conditions requiring special attention.
 - 4. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.
 - 5. Review statement: Written statement, signed by the skylight installer, stating that the Contract Drawings have been reviewed by the skylight manufacturer; accompanied by a written statement from the manufacturer that the selected skylight system, is proper, compatible, and adequate for the application shown.
 - 6. Shop drawings: Include 1/4 inch scale elevations and plans of skylight. Include large scale design details showing attachment clips and brackets, expansion and contraction joint details, flashing details; weep and drainage details, and complete installation details, including field welding.

- a. Drawings must bear seal and signature of same registered professional engineer licensed in the Commonwealth of Massachusetts responsible for calculations, and preparation of submittal.
 - b. Indicate framed opening requirements and tolerances; anchorage and fasteners; pane opening sizes; anticipated deflection under load; affected related work; expansion and contraction joint locations
 - c. Indicate component dimensions, connections and locations, anchorage, methods of joining, and details of all field connections.
 - d. Indicate material, metal thicknesses, metal finishes, glazing seals and sealant application, glass thickness, all surrounding conditions, and all pertinent information.
 - e. Provide plans, including spotting plans for preset inserts, elevations, sections, full size details and complete installation data.
7. Selection samples:
- a. Color samples of manufacturer's custom finish for aluminum for Architect's approval.
8. Verification samples:
- a. Three 12 inch long samples of each subordinate system components including curbs, mullions, closure caps, and miscellaneous aluminum trim components required for a complete installation.
 - b. 8 by 8 inch pieces of each specified type and thickness of glass, bearing labels indicating locations where each type of glass will be used.
9. LEED Submittal Requirements:
- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
1. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.
- 1.7 QUALITY ASSURANCE
- A. Installer specializing in applying the work of this Section with a minimum of 3 years experience and authorized by the product manufacturer.

- B. The skylight manufacturer shall have demonstrated proven experience in skylight work of similar size and complexity using similar types of skylight components. Manufacturer shall provide a list of references to the Architect of at least two projects that have been successfully in use for at least 5 years.
 - C. The skylight manufacturer shall be a single source of responsibility for the specification, design, layout, fabrication and coordination of the components that constitute the complete skylight system.
 - D. The manufacturer for the skylight framing systems shall employ the services of a qualified structural engineer, licensed to practice in the Commonwealth of Massachusetts, to prepare all calculations and other performance criteria for the respective systems, and bear all costs therefor. All shop drawings for the metal components of the respective systems shall bear the registration stamp of the engineer.
 - E. Design, fabricate, assemble and erect the skylights, and their interfacing conditions with contiguous work, to ensure that all segments of the skylight assemblies will be free from leakage.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. Deliver materials in a timely manner to maintain continuous erection. Provide wrapping to protect aluminum surfaces. Do not use adhesive papers which bond when exposed to sunlight or weather.
 - B. Store all materials in an level-elevated location, protected from inclement weather and to allow examination by Architect. Store insulated skylight panels on the long edge, elevated above ground, blocked and under cover to prevent warping. Store in sequence to reduce handling so that materials are moved only during initial delivery to site and erection.
- 1.9 FIELD MEASUREMENTS
- A. Verify that field measurements are as indicated on shop drawings.
- 1.10 PROJECT CONDITIONS
- A. Do not install glazing when ambient temperature is less than 50 degrees Fahrenheit.
 - B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.
- 1.11 SEQUENCING AND SCHEDULING
- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
 - B. Coordinate the work with the installation of structural steel framing, wood curbs and nailers, and roofing system.
 - C. Coordinate this section with dimensions, tolerances, and method of attachment with other adjacent work.
-

1.12 WARRANTIES

- A. Provide 10 year manufacturer's warranty for framing system, under provisions of Section 01 77 00 - CLOSEOUT PROCEDURES. Warranty shall include repair or replacement of any system which leaks, or exhibits defects in materials workmanship, design, or erection.
- B. Provide 5 year manufacturer's warranty for aluminum finish system, under provisions of Section 01 77 00 - CLOSEOUT PROCEDURES. Warranty shall include material replacement of the finish system in locations which exhibit defects in materials or workmanship, including, but not necessarily limited to, loss of adhesion, blistering, pitting, and color fading.
- C. Provide 5 year manufacturer's warranty for insulating glass, under provisions of Section 01 77 00 - CLOSEOUT PROCEDURES. Warranty shall include coverage of insulating glass units from seal failure and replacement of defective units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Wasco Products, Inc., Commercial Division, Sanford ME, product: "350 PYHG".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Wasco Products, Inc., Commercial Division, Sanford ME.
 - 2. Super Sky Products, Inc., Mequon, WI.
 - 3. LinEl Signature, Mooresville, IN.
 - 4. Unisky, Tucker, GA.

2.2 FRAMING MATERIALS

- A. Extruded Aluminum:
 - 1. Provide tubular shapes and profiles of manufacturer's standard construction for members of the skylight system. Web and flange, and 'I-beam' systems are unacceptable.
 - 2. Provide thickness as necessary to comply with the structural loading requirements, wall thickness of supporting members shall not be less than 0.100 inch.
 - 3. Provide aluminum alloy and temper for each shape as recommended by the skylight manufacturer to comply with the requirements of performance, fabrication, application of finish and control of color.
- B. Brackets and reinforcements: Provide aluminum brackets and reinforcements as structurally required. Do not use steel.
- C. Internal Reinforcement: Steel sections, ASTM A36, shapes to suit mullion sections.

2.3 GLASS AND GLAZING MATERIALS

- A. Glass: Insulated float glass: "Low-E," 1 inch thick units, with dual edge seals, consisting of
 - 1. Outer layer: 1/4 inch thick fully tempered safety glass, with Low-E coating on the No. 2 surface.
 - 2. Inner layer: 1/4 inch thick laminated glass, consisting of an outer face and inner face of 1/8-inch thick heat strengthened glass, 0.060 inch thick translucent clear polyvinyl butyl innerlayer equal to Monsanto "Saflex" or DuPont "Butacite.
 - 3. Air space: 1/2 inch thick hermetically sealed dehydrated sealed air space complying with ASTM E 774-88.
 - 4. Secondary seal: Silicone sealant.
- B. Glazing strips:
 - 1. Snap-in or slip-in extruded neoprene meeting or exceeding the following:
 - a. Hardness: (Shore A) 50 +/- durometer
 - b. Tensile Strength (min.) 2,000 psi
 - c. Elongation (min.) 450%
 - 2. All gasketing shall be shop installed in the frames.

2.4 SEALANT MATERIALS

- A. Sealant used within system: As recommended by manufacturer.

2.5 ACCESSORIES

- A. Fasteners:
 - 1. Fasteners used to for the attachment of the exterior and interior caps shall be Type 302/304 stainless steel with neoprene washers equal to material specified for glazing gaskets.
 - 2. Fasteners used for bolting aluminum extrusions and connecting members and for the attachment of the skylight to the supporting curbs shall be aluminum alloy 2024-T5 or Type 302/304 stainless steel.
 - 3. All fasteners shall be finished to match aluminum framing and members.
- B. Anchorage Devices: Type recommended by manufacturer, concealed wherever possible.
- C. Closures and flashing: Aluminum Sheet, minimum 0.040 inch thickness .
- D. Insulation: Glass fiber, stuffing type as specified in Section 07 21 00 - THERMAL INSULATION.
- E. Protective back coating: FS TT-C-494, bituminous.
- F. Touch-up primer for galvanized steel surfaces: Zinc rich type.

2.6 FABRICATION

- A. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof.
- B. Fitting and assembly of the work shall be done in the manufacturer's shop, to the greatest extent possible. Work which cannot be permanently shop assembled shall be completely assembled, marked and disassembled before shipment to the project site to assure proper assembly in the field.
- C. Shop weld aluminum by the heliar process; grind smooth exposed welds. Employ methods recommended by American Welding Society to avoid discoloration at welds and finish welds to closely match adjacent aluminum finishes.
- D. Fabricate components allowing for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly, yet enabling installation.
- E. Rafter bars shall be of extruded aluminum and designed for snap-in neoprene glazing gaskets. Rafter bars shall have the condensation gutters as a portion of the extrusions. Cross bar gutters shall set on top of and drain into rafter gutters. In line gutters or guttering systems requiring sealant are unacceptable.
- F. Maintain continuous air and vapor barrier throughout assembly, with the barrier plane aligned with inside pane of glazing continuing to a heel bead of glazing sealant.
- G. Drain water entering exterior joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.
- H. Prepare components to receive anchor devices. Fabricate anchorage items.
- I. Arrange fasteners, attachments, and jointing to ensure concealment from view.
- J. Complete the shop cutting, fitting, forming, welding, drilling and grinding of all metal work prior to cleaning, finishing, treatment and application of coatings.
- K. Glaze by means of a continuous neoprene glazing strip applied above and below the glass. Continuous neoprene glazing strips and setting blocks at glass quarter points shall be used at the top flange of the extruded aluminum curb for proper glass bearing. A gasket washer shall be used beneath the heads of all fasteners at the exterior caps. Neoprene or polyvinyl chloride spacers shall be used at all extrusions for glass separation. At no point shall glass come in contact with metal parts of the skylight.

2.7 FACTORY FINISHING

- A. Aluminum finish: Shop-applied, fully oven cured Polyvinylidene Fluoride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), NAAMM - Metal Finishes Manual, and the following:
 - 1. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".

2. Finish Coating shall be manufactured as one of the following products:
 - a. Glidden Company; product "Visulure."
 - b. Morton International; product "Fluoroceram CL."
 - c. PPG Industries Inc.; product "Duranar XL."
 - d. Valspar Corp., product: "Flurothane."
 3. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.
 4. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.
 5. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.
 6. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.
 7. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness
 8. Color and Appearance: Provide two colors as provided by Architect including colors designated by the coating manufacturer as "bright," "premium," "pearlescent," or "metallic". Colors shall be in configuration approved by the Architect.
 - a. Gloss: Medium, measured by ASTM D523, 35 plus minus 5 at 60 degrees Fahrenheit.
- B. Concealed Steel Items: Galvanized in accordance with ASTM A386 to 2.0 ounces per square foot.
- C. Isolation coating to cementitious and dissimilar materials: Apply one coat of bituminous paint or other acceptable coating to concealed aluminum surfaces in contact with cementitious and dissimilar materials

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install skylight in accordance with this Section 08 63 00, and the manufacturer's shop drawings, specifications and recommendations.
- B. Install skylights plumb, level and true to line. Align assembly free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- C. Provide method of attachment to structure to permit sufficient adjustment to accommodate construction tolerances and irregularities.

1. Provide alignment attachments, shims, and anchors required to permanently fasten skylight system to building structure.
 - D. Attach and seal to adjacent air and vapor barrier materials.
 - E. Install sill flashings.
 - F. Pack fibrous insulation in shim spaces at perimeter of assembly to ensure continuity of thermal barrier.
 - G. Clean aluminum and glass surfaces during installation of components. Remove excess sealant compounds dirt and other substances.
 - H. Install glass in accordance with manufacturer's requirements and requirements of this Section, where conflicts do occur the most stringent requirements shall apply.
 - I. Install perimeter joint sealant and backing materials as specified herein, in accordance with Section 07 92 00 - JOINT SEALANTS.
- 3.3 TOLERANCES
- A. Maximum Variation from Plane: 1/8-inch every 3 feet maximum or 1/4-inch per 100 feet, whichever is less.
 - B. Alignment of Two Adjoining Members Abutting in Plane: Within 0.015 inches .
- 3.4 CLEANING
- A. Protect finished metal surfaces from damage during shipping, storage, and erection. Remove protective material from prefinished aluminum surfaces at time of Final Cleaning.
 - B. Remove excess sealant, dirt and other foreign substances. Wash down exposed surfaces; wipe surfaces clean.
 - C. Clean and polish all glass surfaces.

End of Section

Section 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

- B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

- C. Related Sections:

1. Division 01 Section "Product Requirements"
2. Division 08 Section "Hollow Metal Doors and Frames".
3. Division 08 Section "Flush Wood Doors".
4. Division 08 Section "Clad Wood Doors".
5. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
6. Division 26 Section "Electrical".
7. Division 28 Section "Access Control".

- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ADA Standards for Accessible Design 2010.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.
8. 521 CMR – Massachusetts Architectural Board Regulations.

- E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Architect's hardware set number, shown in door schedule or separate listing.
 - c. Manufacturer of each item.
 - d. Fastenings and other pertinent information.
 - e. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - f. Explanation of abbreviations, symbols, and codes contained in schedule.
 - g. Mounting locations for door hardware.
 - h. Door and frame sizes and materials.
 - i. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

- a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
 - D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
 - E. Informational Submittals:
 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
 - F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.
- 1.4 QUALITY ASSURANCE
- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
 - B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
 - C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
 - D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
- G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.
 - 2. Five years for exit hardware.
 - 3. Twenty five years for manual surface door closer bodies.
 - 4. Five years for motorized electric latch retraction exit devices.
 - 5. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" heavy weight.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight, stainless steel.
 - 4. Hinge Options: Comply with the following:

- a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

- a. Bommer Industries (BO).
- b. Hager Companies (HA).
- c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).

- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs. Provide custom screw pattern where required to accommodate thermally-broken doors.

1. Manufacturers:

- a. Bommer Industries (BO).
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
- c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

- C. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 certified pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed teflon coated stainless pin, and twin self lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs; auto door bottoms.

1. Manufacturers:

- a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
- c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

- a. ACSI (AC) – ETW (# wires) Option
- b. Hager Companies (HA) - ETW-QC (# wires) Option.
- c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - QC (# wires) Option.

- B. Electrified Quick Connect Continuous Geared Transfer Hinges: Provide electrified transfer continuous geared hinges with a 12" removable service panel cutout accessible without de-

mounting door from the frame. Furnish with Molex™ standardized plug connectors with sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

- a. Bommer Industries (BO) - SER-QC (# of wires) Option.
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - SER-QC (# wires) Option.
- c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE) - SER-QC (# wires) Option.

C. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

- a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Electrical Connecting Kit: QC-R001.
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

- a. Hager Companies (HA) - Quick Connect.
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – QC-C Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

- a. Burns Manufacturing (BU).

- b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).
 - B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.
 - 1. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).
 - C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 - 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 - 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 - 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 - 5. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).
- 2.5 CYLINDERS AND KEYING
- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
 - B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
 - 1. Manufacturers:
 - a. Corbin Russwin Hardware (RU).
 - b. No Substitution.
 - C. Cylinders: Original manufacturer cylinders complying with the following:
 - 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
 - 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 5. Keyway: Match Facility 97 keyway.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 3. Existing System: Key locks to Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Four (4)
 2. Master Keys (per Master and Grand Master Key Level/Group): Six (6).
 3. Construction Keys (where required): Ten (10).
- F. Construction Keying: Provide construction master keyed cylinders.
- G. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 2. Provide transcript list in writing or electronic file as directed by the Owner.
- H. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
- I. Key Cabinet Set-Up: All keys on hooks and tags, clips, forms, cards completed and cross-referenced.
1. Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).
- J. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into "Key Wizard" software.
- 2.6 MECHANICAL LOCKS AND LATCHING DEVICES
- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Manufacturers:

- a. Corbin Russwin Hardware (RU) – ML2000 Series.
- b. Sargent Manufacturing (SA) – 8200 Series.
- c. Schlage (SC) – L9000 Series.

B. Multi-Point Locksets: Vertical rod locking devices designed for openings requiring multiple latching points within one locking mechanism. Rods are retracted by dual mounted outside lever trim controls available in a variety of ANSI/BHMA operational functions. Option for single top latching only eliminates the need for bottom strikes.

1. Manufacturers:

- a. Corbin Russwin Hardware (RU) – MP9800 Series.
- b. Sargent Manufacturing (SA) - 7000 Series.

C. Knurling: Provide knurling on outside lock/exit device levers on doors leading to hazardous areas such as electric, emergency electric, mechanical rooms, boiler and furnace rooms, janitor closets, acid neutralization rooms and as otherwise required.

2.7 ELECTROMECHANICAL LOCKING DEVICES

A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below.

- 1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, deadbolt monitoring, and request-to-exit signaling. Support end-of-line resistors contained within the lock case. Unless otherwise indicated, provide electrified locksets standard as fail secure.
- 2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML20900 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
 - c. Schlage (SC) - L9000 EL/EU/RX Series.

2.8 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:

- a. Corbin Russwin Hardware (RU) - DL4100 Series.
- b. Sargent Manufacturing (SA) - 4870 Series.
- c. Schlage (SC) - L460 Series.

2.9 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 4. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 3. Except on fire rated doors, provide exit devices with key cylinder dogging device to hold the pushbar and latch in a retracted position.
 4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 5. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 6. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

7. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.
 8. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 9. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 10. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 11. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 12. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 13. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.
 - c. Von Duprin (VD) - 35A/98 XP Series.
- C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish.
1. Provide keyed removable feature where specified in the Hardware Sets.
 2. Provide stabilizers and mounting brackets as required.
 3. Provide electrical quick connection wiring options as specified in the hardware sets.
 4. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - 700/900 Series.
 - b. Sargent Manufacturing (SA) - 980S Series.
 - c. Von Duprin (VD) - 9954 Series.

2.11 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
 4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
 5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets. Provide heavy-duty stop arms for interior, low-frequency applications only, as specified in the hardware sets.
 6. Closers shall not be installed on exterior side of doors; where possible install closers on door for optimum aesthetics. PER OWNER REQUEST, PROVIDE PARALLEL ARMS FOR ALL DOOR CLOSERS.
 7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC8000 Series.
 - b. LCN Closers (LC) - 4040XP Series.
 - c. Norton Door Controls (NO) – 9500 Series.
 - d. Sargent Manufacturing (SA) - 281 Series.
- C. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 certified surface mounted, high efficiency door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.
1. Manufacturers:

- a. Corbin Russwin (RU) - DC5000 Series.
- b. Norton Door Controls (NO) - 2800ST Series.
- c. Sargent Manufacturing (SA) - 422 Series.

2.12 SURFACE MOUNTED CLOSER HOLDERS

- A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate 12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button. Provide armature extension links as required to suit degree of door opening.
1. Manufacturers:
 - a. LCN Door Closers (LC) - SEM7800 Series.
 - b. Rixson (RF) - 980/990 Series.
 - c. Sargent Manufacturing (SA) - 1560 Series.

2.13 ARCHITECTURAL TRIM

A. Door Protective Trim

1. Coordinate kick plate locations with Architect and clad wood door manufacturer, if used.
2. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
3. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
4. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
5. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
6. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
7. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

- c. Trimco (TC).

2.14 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 - 1. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function. Do not provide overhead stops where door projects more than half way into the required egress corridor width when opened to 90 degree position (door must be allowed to swing 180 degrees). Where aluminum door construction will not allow a full-size concealed overhead stop, provide Rixson 6 Series.
 - 1. Manufacturers:
 - a. Rixson Door Controls (RF) – 1 Series or 9 Series.
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Sargent Manufacturing (SA).

2.15 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Install weather, smoke, sound seals prior to all other surface applied hardware to provide a complete seal around the perimeter of the opening. Do not cut or notch for surface applied hardware.
- F. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- G. Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.16 ELECTRONIC ACCESSORIES

- A. Switching Power Supplies: Provide UL listed or recognized filtered and regulated power supplies. Provide single, dual, or multi-voltage units as shown in the hardware sets. Units must be expandable up to eight Class 2 power limited outputs. Units must include the capability to incorporate a battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
 - 1. Manufacturers:
 - a. Securitron (SU) - AQ Series.
 - b. Coordinate with electrified device mfr.

2.17 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.18 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.
- 3.4 FIELD QUALITY CONTROL
- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.
- 3.5 ADJUSTING
- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- 3.6 CLEANING AND PROTECTION
- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality. Provide a keyed cylinder for every locking device. Provide a door closer for every exterior, egress, fire rated and access controlled door.
- B. The supplier is responsible for handing and sizing all products as listed in the door hardware sets. Quantities listed are for each pair of doors, or for each single door.
- C. Manufacturer's Abbreviations:

1. MK - McKinney
2. MR - Markar
3. PE - Pemko
4. RO - Rockwood
5. SA - Sargent
6. RU - Corbin Russwin
7. RF - Rixson
8. SU - Securitron
9. OT - OTHER

Hardware Sets

Set: 1.0

Description: Exterior Alum Pair - Card Access; Remote Control

2	Continuous Hinge (12-wire)	CFM-SLF-HD1 SER12 Series		PE
1	Key Removable Mullion	L980S	PC	SA
1	Exit Device (rim, EL, RX, CD)	16 55 56 LC 8810	US32D	SA
1	Exit Device (rim, NL, EL, RX, CD)	16 55 56 LC 8804	US32D	SA
4	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Mullion Cylinder Kit	980C1 less cylndr	US26D	SA
2	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
2	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Threshold (coord w/ details)	274x292AFGPK FHSL14SS		PE
1	Mullion Gasket	5110BL		PE
2	Door Wiring Harness	QC-Cxxx (hinge to device)		MK
2	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
2	Position Switch (concealed)	By Division 28		SU

1	Power Supply	AQD6-8F8R (coord w/ Div 28)	SU
1	Remote Control Switch	By Division 28	00
1	Weather/Perimeter Seals	Supplied with door/frame assembly	00
1	Card Reader	By Division 28	00

Notes: Coordinate final card reader and remote release locations with security vendor (typ).

Operation: Door is normally closed and secured. Valid card at reader or signal from remote control switch retracts latch for momentary or extended access. Remote control switch releases latch for lock-down. Monitoring by door position switches. During a loss of power the doors will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 2.0

Description: Exterior Alum Pair - Card Access

2	Continuous Hinge (12-wire)	CFM-SLF-HD1 SER12 Series	PE
1	Key Removable Mullion	L980S	PC SA
1	Exit Device (rim, NL, EL, RX, CD)	16 55 56 LC 8804	US32D SA
1	Exit Device (rim, RX, CD)	16 55 LC 8810	US32D SA
4	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626 RU
1	Mullion Cylinder Kit	980C1 less cylnr	US26D SA
2	Door Pull (45 deg offset)	BF168 12HD	US32D RO
2	Concealed Overhead Stop	1-X36	630 RF
2	Door Closer (parallel arm)	MC 281 P10	EN SA
1	Threshold (coord w/ details)	274x292AFGPK FHSL14SS	PE
1	Mullion Gasket	5110BL	PE
2	Door Wiring Harness	QC-Cxxx (hinge to device)	MK
2	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)	MK
2	Position Switch (concealed)	By Division 28	SU
1	Power Supply	AQD6-8F8R (coord w/ Div 28)	SU
1	Weather/Perimeter Seals	Supplied with door/frame assembly	00
1	Card Reader	By Division 28	00

Notes:

Operation: Door is normally closed and secured. Valid card at reader retracts latch for momentary access. Monitoring by door position switches. During a loss of power the doors will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 3.0

Description: Exterior Alum Pair

2	Continuous Hinge	CFM-SLF-HD1 Series	PE
1	Key Removable Mullion	L980S	PC SA
1	Exit Device (rim, NL, CD)	16 LC 8804	US32D SA
1	Exit Device (rim, CD)	16 LC 8810	US32D SA
4	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626 RU
1	Mullion Cylinder Kit	980C1 less cylnr	US26D SA
2	Door Pull (45 deg offset)	BF168 12HD	US32D RO
2	Concealed Overhead Stop	1-X36	630 RF

2	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Threshold (coord w/ details)	274x292AFGPK FHSL14SS		PE
1	Mullion Gasket	5110BL		PE
2	Position Switch (concealed)	By Division 28		SU
1	Weather/Perimeter Seals	Supplied with door/frame assembly		00

Set: 4.0

Description: Exterior Alum Sgl - Card Access

1	Continuous Hinge (12-wire)	CFM-SLF-HD1 SER12 Series		PE
1	Exit Device (rim, NL, EL, RX, CD)	16 55 56 LC 8804	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
1	Concealed Overhead Stop	1-X36	630	RF
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Threshold (coord w/ details)	274x292AFGPK FHSL14SS		PE
1	Door Wiring Harness	QC-Cxxx (hinge to device)		MK
1	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1	Position Switch (concealed)	By Division 28		SU
1	Power Supply	AQD6-8F8R (coord w/ Div 28)		SU
1	Weather/Perimeter Seals	Supplied with door/frame assembly		00
1	Card Reader	By Division 28		00

Notes:

Operation: Door is normally closed and secured. Valid card at reader retracts latch for momentary or extended access. Monitoring by door position switch. During a loss of power the doors will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 5.0

Description: Exterior Alum Service Door - Card Access; Remote Release

1	Continuous Hinge (12-wire)	CFM-SLF-HD1 SER12 Series		PE
1	Mortise Lock (fail secure, RX)	ML20906-SEC 109X M92 97-6P GMK CMK 626		RU
1	Surface Closer (track, pull side)	MC 422 CTB2	EN	SA
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Threshold (coord w/ details)	172AK FHSL14SS		PE
1	Sweep	3452APK		PE
1	Door Wiring Harness	QC-Cxxx (hinge to device)		MK
1	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1	Position Switch (concealed)	By Division 28		SU
1	Power Supply	AQD6-8F8R (coord w/ Div 28)		SU
1	Remote Control Switch	By Division 28		00
1	Weather/Perimeter Seals	Supplied with door/frame assembly		00
1	Card Reader	By Division 28		00

Notes:

Operation: Door is normally closed and secured. Valid card at reader or signal from remote control switch unlocks outside lever for momentary access. Monitoring by door position switch. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 6.0

Description: Exterior Alum Sgl

1	Continuous Hinge	CFM-SLF-HD1 Series		PE
1	Exit Device (rim, NL, CD)	16 LC 8804	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
1	Concealed Overhead Stop	1-X36	630	RF
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Threshold (coord w/ details)	274x292AFGPK FHSL14SS		PE
1	Position Switch (concealed)	By Division 28		SU
1	Weather/Perimeter Seals	Supplied with door/frame assembly		00

Set: 7.0

Description: Exterior HM Sgl - Roof Service

1	Continuous Hinge	CFM-SLF-HD1 Series		PE
1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Concealed Overhead Stop	1-X36	630	RF
1	Surface Closer (track)	MC 422 Series (mount inside bldg)	EN	SA
1	Threshold (coord w/ details)	172AK FHSL14SS		PE
1	Head & Jamb Seal	2891AS		PE
1	Sweep	3452APK		PE
1	Position Switch (concealed)	By Division 28		SU

Notes: Free egress from roof. Provide 281 P10 closer for out-swing doors.

Set: 8.0

Description: Interior Alum Vestibule Pair - Card Access; Remote Release

2	Continuous Hinge (12-wire)	CFM-SLF-HD1 SER12 Series		PE
1	Key Removable Mullion	L980S	PC	SA
1	Exit Device (rim, EL, RX, CD)	16 55 56 LC 8810	US32D	SA
1	Exit Device (rim, NL, EL, RX, CD)	16 55 56 LC 8804	US32D	SA
4	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Mullion Cylinder Kit	980C1 less cylnr	US26D	SA
2	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
2	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Threshold (coord w/ details)	271A FHSL14SS		PE
1	Mullion Gasket	5110BL		PE
2	Door Wiring Harness	QC-Cxxx (hinge to device)		MK
2	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1	Power Supply	AQD6-8F8R (coord w/ Div 28)		SU
1	Remote Control Switch	By Division 28		00
1	Weather/Perimeter Seals	Supplied with door/frame assembly		00
1	Card Reader	By Division 28		00

Notes: Coordinate final card reader and remote release locations with security vendor (typ).

Operation: Door is normally closed and secured. Valid card at reader or remote control switch retracts latch for momentary or extended access. Remote control switch releases latch for lock-down. Monitoring

by door position switches. During a loss of power the doors will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 9.0

Description: Interior Alum Vestibule Pair

2	Continuous Hinge	CFM-SLF-HD1 Series		PE
1	Key Removable Mullion	L980S	PC	SA
1	Exit Device (rim, NL, CD)	16 LC 8804	US32D	SA
1	Exit Device (rim, CD)	16 LC 8810	US32D	SA
4	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Mullion Cylinder Kit	980C1 less cylindr	US26D	SA
2	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
2	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Threshold (coord w/ details)	271A FHSL14SS		PE
1	Mullion Gasket	5110BL		PE
1	Weather/Perimeter Seals	Supplied with door/frame assembly		00

Set: 10.0

Description: Interior Vestibule Pair 90 Min Rated - Card Access; Remote Release

2	Continuous Hinge (12-wire)	CFM-SLF-HD1 SER12 Series		PE
1	Key Removable Mullion	12-L980	PC	SA
1	Exit Device (rim, EL, RX)	12 55 56 8810	US32D	SA
1	Exit Device (rim, NL, EL, RX)	12 LC 55 56 8804	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Mullion Cylinder Kit	980C1 less cylindr	US26D	SA
2	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
2	Concealed Overhead Stop	1-X36	630	RF
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Threshold (coord w/ details)	271A FHSL14SS		PE
1	Mullion Gasket	5110BL		PE
2	Door Wiring Harness	QC-Cxxx (hinge to device)		MK
2	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1	Power Supply	AQD6-8F8R (coord w/ Div 28)		SU
1	Remote Control Switch	By Division 28		00
1	Weather/Perimeter Seals	Supplied with door/frame assembly		00
1	Card Reader	By Division 28		00

Notes:

Operation: Doors are normally closed and secured. Valid card at reader or remote control switch retracts latch for momentary or extended access. Remote control switch releases latch for lock-down. Monitoring by door position switches. During a loss of power the doors will default to secure. Free egress at all times. Lock status will default to secure when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 11.0

Description: Interior Alum Sgl - Service

1	Continuous Hinge	CFM-SLF-HD1 Series		PE
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1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Concealed Overhead Stop	1-X36	630	RF
1	Surface Closer (track, pull side)	MC 422 CTB2	EN	SA
1	Threshold (coord w/ details)	172AK FHSL14SS		PE
1	Position Switch (concealed)	By Division 28		SU
1	Weather/Perimeter Seals	Supplied with door/frame assembly		00

Set: 12.0

Description: Receiving Pair

2	Continuous Hinge	FM300	630	MR
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK	626	RU
1	Coordinator	1700	Black	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Armor Plate	K1050 34" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Threshold (coord w/ details)	271A FHSL14SS		PE
1	Head & Jamb Seal	2891AS		PE
2	Sweep	18061CNB		PE
1	Astragal	352CR		PE

Set: 13.0

Description: Recycle / Trash Pair

2	Continuous Hinge	FM300	630	MR
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1	Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU
1	Coordinator	1700	Black	RO
2	Surface Overhead Holder	9-X26	630	RF
2	Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
2	Armor Plate	K1050 34" 4BE CSK	US32D	RO
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
2	Silencer	608		RO

Set: 14.0

Description: Kitchen Pair

2	Continuous Hinge	FM300	630	MR
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK	626	RU
1	Coordinator	1700	Black	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Armor Plate	K1050 34" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Threshold (coord w/ details)	271A FHSL14SS		PE
2	Sweep	18061CNB		PE
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
2	Silencer	608		RO

Set: 14.1

Description: Kitchen Sgl

1	Continuous Hinge	FM300	630	MR
1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Armor Plate	K1050 34" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Threshold (coord w/ details)	271A FHSL14SS		PE
1	Sweep	18061CNB		PE
3	Silencer	608		RO

Set: 15.0

Description: Kitchen Dry Storage Pair

2	Continuous Hinge	FM300	630	MR
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1	Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU
1	Coordinator	1700	Black	RO
2	Surface Overhead Holder	9-X26	630	RF
2	Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
2	Armor Plate	K1050 34" 4BE CSK	US32D	RO
2	Sweep	18061CNB		PE
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE

Set: 16.0

Description: Wellness; Shop Pair Rated

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Key Removable Mullion	12-L980	PC	SA
2	Exit Device (rim, intruder)	12 49 LC 8816 ETMG	US32D	SA
5	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2	Surface Overhead Stop	9-X36	630	RF
2	Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Head & Jamb Seal	2891AS		PE
1	Mullion Gasket	5110BL		PE
2	Mortise Auto Door Bottom	434ARL ACP112BL		PE
2	Astragal	303AS		PE

Set: 17.0

Description: Assembly Pair

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Key Removable Mullion	L980S	PC	SA
1	Exit Device (rim, NL, CD)	16 LC 8804	US32D	SA
1	Exit Device (rim, CD)	16 LC 8810	US32D	SA
4	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO

1	Mullion Gasket	5110BL		PE
1	Head & Jamb Seal	303AS		PE
2	Z-Bracket (to suit seal size)	BKT050SP		PE
2	Astragal	303AS		PE

Set: 17.1

Description: Assembly Pair - Door Bottom

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Key Removable Mullion	L980S	PC	SA
1	Exit Device (rim, NL, CD)	16 LC 8804	US32D	SA
1	Exit Device (rim, CD)	16 LC 8810	US32D	SA
4	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Mullion Gasket	5110BL		PE
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
2	Mortise Auto Door Bottom	434ARL ACP112BL		PE
2	Astragal	303AS		PE

Set: 17.2

Description: Assembly Pair - Cafeteria; Contin Hinge

2	Continuous Hinge	FM300	630	MR
1	Key Removable Mullion	L980S	PC	SA
1	Exit Device (rim, NL, CD)	16 LC 8804	US32D	SA
1	Exit Device (rim, CD)	16 LC 8810	US32D	SA
4	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Mullion Gasket	5110BL		PE
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
2	Astragal	303AS		PE

Set: 18.0

Description: Band; Chorus Pair

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Key Removable Mullion	L980S	PC	SA
2	Exit Device (rim, intruder, LD)	49 LD LC 8816 ETMG	US32D	SA
5	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2	Surface Overhead Stop	9-X36	630	RF
2	Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Head & Jamb Seal	2891AS		PE
1	Mullion Gasket	5110BL		PE
2	Mortise Auto Door Bottom	434ARL ACP112BL		PE

2 Astragal 303AS PE

Set: 19.0

Description: Stage Pair Rated

6 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Key Removable Mullion	12-L980	PC	SA
2 Exit Device (rim, intruder)	12 49 LC 8816 ETMG	US32D	SA
5 Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2 Surface Overhead Stop	9-X36	630	RF
2 Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
2 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal	2891AS		PE
1 Mullion Gasket	5110BL		PE
2 Mortise Auto Door Bottom	434ARL ACP112BL		PE
2 Astragal	303AS		PE
1 Astragal (adhesive, edge mount)	S771C		PE

Set: 20.0

Description: Gym/Assembly Pair Rated

2 Continuous Hinge	FM300	630	MR
1 Key Removable Mullion	12-L980	PC	SA
2 Exit Device (rim, intruder)	12 49 LC 8816 ETMG	US32D	SA
5 Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2 Door Closer (parallel arm)	MC 281 P10	EN	SA
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
2 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Mullion Gasket	5110BL		PE
1 Head & Jamb Seal (adhesive)	S88BL		PE
1 Astragal (adhesive, edge mount)	S771C		PE

Set: 21.0

Description: Assembly Sgl - Fire Rated

3 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Exit Device (rim, intruder)	12 49 LC 8816 ETMG	US32D	SA
2 Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1 Door Pull (45 deg offset)	BF168 12HD	US32D	RO
1 Door Closer (parallel arm)	MC 281 P10	EN	SA
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal	2891AS		PE
1 Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 21.1

Description: Chorus; Piano Lab

3 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Exit Device (rim, intruder, LD)	49 LD LC 8816 ETMG	US32D	SA
2 Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1 Door Closer (parallel arm)	MC 281 P10	EN	SA

1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal	2891AS		PE
1 Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 21.2

Description: Media Center - Alarmed

1 Hinge (heavy weight)	T4A3386 QC12	US32D	MK
2 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Exit Device (rim, intruder, alarm)	AL LC 49 8816 ETMG	US32D	SA
3 Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1 Door Closer (parallel arm)	MC 281 P10	EN	SA
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal	2891AS		PE
1 Door Wiring Harness	546		SA
1 Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1 Power Supply (9v)	3267		SA
1 Card Reader	By Division 28		00

Notes:

Operation: Door is normally closed and armed. Valid card at reader on media center side disarms alarm for momentary access. Free alarmed egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate local alarm. Inside or outside lock/unlock outside lever. Key switch in pushrail arms/disarms alarm.

Set: 22.0

Description: Stair; Corridor Pair - Hold Open

6 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
2 Exit Device (SVR, LBR, passage)	12 NB8715 ETMG	US32D	SA
2 Door Closer (parallel arm)	MC 281 P10	EN	SA
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
2 Electromagnetic Holder	998M (or to suit conditions)	689	RF
1 Head & Jamb Seal (adhesive)	S88BL		PE
1 Astragal (adhesive, edge mount)	S771C		PE

Notes: Interface with building fire alarm system to release doors from hold-open.

Set: 23.0

Description: Stair; Corridor Sgl - Lockable

3 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Exit Device (rim, intruder)	12 49 LC 8816 ETMG	US32D	SA
2 Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1 Door Closer (parallel arm)	MC 281 P10	EN	SA
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal (adhesive)	S88BL		PE

Set: 24.0

Description: Stair Sgl - Card Access (both directions)

2	Hinge (heavy weight)	T4A3386 QC12	US32D	MK
1	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Exit Device (rim, fail safe, alarm)	AL 12 LC 8875 ETMG	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal (adhesive)	S88BL		PE
1	Door Wiring Harness	546		SA
1	Door Wiring Harness	QC-Cxxx (hinge to device)		MK
2	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1	Position Switch (concealed)	By Division 28		SU
1	Power Supply	AQD6-8F8R (coord w/ Div 28)		SU
1	Power Supply (9v)	3267		SA
2	Card Reader	By Division 28		00

Notes:

Operation: Door is normally closed, locked and armed. Valid card at outside reader unlocks outside lever for momentary access. Valid card at inside reader disarms alarm for momentary egress. Monitoring by door position switch. During a loss of power the door will remain latched, but unlocked. Free alarmed egress at all times. Lock status will change to latched, but unlocked when the fire detection/suppression systems are activated. Key switch in pushrail arms/disarms alarm. Outside key override.

Set: 25.0

Description: Band/Chorus Corridor

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Exit Device (rim, intruder, LD)	49 LD LC 8816 ETMG	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	2891AS		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 26.0

Description: Office; Conference; Multi-Purpose

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal (adhesive)	S88BL		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Notes: Provide passage function at B101A?

Set: 27.0

Description: Work Room; Clean Supply; Security Office

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU

1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Notes: Provide passage function at B101A?

Set: 28.0

Description: Classroom Pair; Andy's Attic

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK626		RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
2	Silencer	608		RO

Set: 29.0

Description: Classroom

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK626		RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 29.1

Description: Teacher Planning; Waiting; Gen Office

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK626		RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 29.2

Description: Science Lab; Art Lab; Voc Learning; Pre-K

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Exit Device (rim, intruder, LD)	49 LD LC 8816 ETMG	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 30.0

Description: Classroom Connector

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Passage Latch	ML2010 109X	626	RU
1	Surface Overhead Stop	9-X36	630	RF
1	Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Head & Jamb Seal	2891AS		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 31.0

Description: Classroom Connector - Corridor/Kitchen/Prep

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Intruder Lock (2-way)	ML2002 109X M19SN 97-6P GMK CMK	626	RU
1	Red Locking Screw	684F067 (for 2-way intruder lock)		RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Notes: Lock functions as passage set under normal conditions. Key from either side locks and unlocks both levers with visual locking indicator on both sides. Key does not retract latch.

At one of the two egress doors from each connecting space, provide a standard ML2055 classroom function to allow free egress at all times.

Set: 31.1

Description: Classroom Connector - Speech/Pre-K

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Intruder Lock (2-way)	ML2002 109X M19SN 97-6P GMK CMK	626	RU
1	Red Locking Screw	684F067 (for 2-way intruder lock)		RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Notes: Lock functions as passage set under normal conditions. Key from either side locks and unlocks both levers with visual locking indicator on both sides. Key does not retract latch.

At one of the two egress doors from each connecting space, provide a standard ML2055 classroom function to allow free egress at all times.

Set: 32.0

Description: Classroom Connector - Storage

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Intruder Lock (2-way)	ML2002 109X M19SN 97-6P GMK CMK	626	RU
1	Red Locking Screw	684F067 (for 2-way intruder lock)		RU

1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Notes: Lock functions as passage set under normal conditions. Key from either side locks and unlocks both levers with visual locking indicator on both sides. Key does not retract latch.

At one of the two egress doors from each connecting space, provide a standard ML2055 classroom function to allow free egress at all times.

Set: 33.0

Description: Uniform Fitting

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK626		RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 34.0

Description: Stage Pair 10 ft; Fire Rated

2	Continuous Hinge	FM300	630	MR
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK626		RU
1	Half Dummy Trim	ML2050 109X	626	RU
1	Coordinator	1700	Black	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	2891AS		PE
2	Door Bottom (surface)	4301CRL		PE
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
1	Astragal (adhesive, edge mount)	S771C		PE

Set: 34.1

Description: Storage Pair 10 ft; Fire Rated

2	Continuous Hinge	FM300	630	MR
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Half Dummy Trim	ML2050 109X	626	RU
1	Coordinator	1700	Black	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal (adhesive)	S88BL		PE
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
1	Astragal (adhesive, edge mount)	S771C		PE

Set: 34.2

Description: Gym Pair (from PE Storage Area); Fire Rated

2	Continuous Hinge	FM300	630	MR
1	Dust Proof Strike	570	US26D	RO
1	Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK	626	RU
1	Half Dummy Trim	ML2050 109X	626	RU
1	Pull Plate (gym side, inactive leaf)	93-RKW	US32D	RO
1	Coordinator	1700	Black	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	2891AS		PE
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
1	Astragal (adhesive, edge mount)	S771C		PE

Set: 35.0

Description: Classroom Prep/Storage

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU
1	Surface Overhead Stop	9-X36	630	RF
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
3	Silencer	608		RO

Set: 36.0

Description: Practice

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Passage Latch	ML2010 109X	626	RU
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 37.0

Description: Band Storage

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 38.0

Description: Band Storage (Inner door)

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
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1 Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal	303AS		PE
1 Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 39.0

Description: Gym Storage; Table Storage; Closet Pair

6 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Dust Proof Strike	570	US26D	RO
1 Flush Bolt Set (constant-latching)	2845; 2945	US26D	RO
1 Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU
2 Surface Overhead Stop	9-X36	630	RF
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
2 Silencer	608		RO

Notes: Provide wall stop/floor in lieu of overhead stop at 90 degree wall conditions.

Set: 40.0

Description: Closet; Jan Sgl

3 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU
1 Surface Overhead Stop	9-X36	630	RF
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
3 Silencer	608		RO

Notes: Provide wall stop/floor in lieu of overhead stop at 90 degree wall conditions.

Set: 41.0

Description: Chase from Jan

3 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1 Surface Overhead Stop	9-X36	630	RF
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
3 Silencer	608		RO

Set: 42.0

Description: Day Care Laundry; Closet Sgl - Passage

3 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Passage Latch	ML2010 109X	626	RU
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal (adhesive)	S88BL		PE
1 Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 43.0

Description: Andy's Attic from Dist.

3 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Classroom Lock	ML2055 109X 97-6P GMK CMK	626	RU

1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 44.0

Description: Sgl User Toilet - Privacy

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Privacy Set	ML2030 109X M19V	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Mop Plate	K1050 4" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO
1	Coat Hook	RM823	US32D	RO

Set: 44.1

Description: Sgl User Toilet - Locked

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Hotel Lock (restroom)	ML2029 109X M19V 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Mop Plate	K1050 4" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO
1	Coat Hook	RM823	US32D	RO

Set: 45.0

Description: Dressing Rm

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Privacy Set	ML2030 109X M19V	626	RU
1	Surface Overhead Stop	9-X36	630	RF
1	Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
3	Silencer	608		RO
1	Coat Hook	RM823	US32D	RO

Set: 46.0

Description: Exam

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Privacy Set	ML2030 109X M19V	626	RU
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO
1	Coat Hook	RM823	US32D	RO

Set: 47.0

Description: Med Room

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal (adhesive)	S88BL		PE

Set: 48.0

Description: Observation; Day Care Office

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK	626	RU
1	Door Closer (stop arm)	MC 281 CPS	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 49.0

Description: Therapy Plan - Full height wall pad on door

1	Continuous Hinge	FM300	630	MR
1	Behavioral Health (passage)	ML2010 BHSS	630	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
1	Mortise Auto Door Bottom	434ARL ACP112BL		PE

Set: 50.0

Description: Locker Room - Panic

1	Continuous Hinge	FM300	630	MR
1	Exit Device (rim, intruder, LD)	49 LD LC 8816 ETMG	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 50.1

Description: Visiting Team Locker Room - Panic; Card Access

1	Continuous Hinge (12-wire)	FM300 EL12 ETAP	630	MR
1	Exit Device (rim, NL, EL, RX, CD)	16 55 56 LC 8804	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Door Pull (45 deg offset)	BF168 12HD	US32D	RO
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO
1	Door Wiring Harness	QC-Cxxx (hinge to device)		MK

1	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)	MK
1	Position Switch (concealed)	By Division 28	SU
1	Power Supply	AQD6-8F8R (coord w/ Div 28)	SU
1	Card Reader	By Division 28	00

Notes:

Operation: Doors are normally closed and locked. Valid card at reader retracts latch for momentary access. Monitoring by door position switches. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Depressing pushrail will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 51.0

Description: Family Locker Room

1	Continuous Hinge	FM300	630	MR
1	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 52.0

Description: Gang Restroom; Lockers

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Deadbolt (classroom)	DL4117 97-6P GMK CMK	626	RU
1	Push Plate	70F CFTT/CFC	US32D	RO
1	Pull Plate	110x70C CFTT/CFC	US32D	RO
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Mop Plate	K1050 4" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 52.1

Description: Gang Restroom; Lockers - Contin Hinge

1	Continuous Hinge	FM300	630	MR
1	Deadbolt (classroom)	DL4117 97-6P GMK CMK	626	RU
1	Push Plate	70F CFTT/CFC	US32D	RO
1	Pull Plate	110x70C CFTT/CFC	US32D	RO
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Mop Plate	K1050 4" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 52.2

Description: Vestibule - Push/Pull

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Pull Plate	110x70C	US32D	RO

1	Push Plate	70E	US32D	RO
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE

Set: 52.3

Description: Vestibule Pair - Push/Pull

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
2	Pull Plate	110x70C	US32D	RO
2	Push Plate	70E	US32D	RO
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
1	Astragal	303AS		PE

Set: 53.0

Description: Main Elec; Emerg Elec

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Exit Device (rim, storeroom)	12 LC 8846 ETMG	US32D	SA
1	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal (adhesive)	S88BL		PE

Set: 54.0

Description: Mech/Elec Pair

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Key Removable Mullion	12-L980	PC	SA
1	Exit Device (rim, storeroom)	12 LC 8846 ETMG	US32D	SA
1	Exit Device (rim, EO)	12 8810	US32D	SA
2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Mullion Gasket	5110BL		PE
1	Head & Jamb Seal (adhesive)	S88BL		PE
1	Astragal (adhesive, edge mount)	S771C		PE

Set: 55.0

Description: Telcom; Data; Server; Waiting; Gen Office - Card Access

1	Hinge (heavy weight)	T4A3386 QC12	US32D	MK
2	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Mortise Lock (fail secure, RX)	ML20906-SEC 109X M92 97-6P GMK CMK 626		RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA

1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal (adhesive)	S88BL		PE
1 Door Wiring Harness	QC-Cxxx (hinge to device)		MK
1 Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1 Position Switch (concealed)	By Division 28		SU
1 Power Supply	AQD6-8F8R (coord w/ Div 28)		SU
1 Card Reader	By Division 28		00

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 56.0

Description: Telcom Pair - Card Access

1 Hinge (heavy weight)	T4A3386 QC12	US32D	MK
5 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Dust Proof Strike	570	US26D	RO
2 Flush Bolt	555	US26D	RO
1 Mortise Lock (fail secure, RX)	ML20906-SEC 109X M92 97-6P GMK	CMK 626	RU
2 Door Closer (stop arm)	MC 281 CPS	EN	SA
2 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Head & Jamb Seal (adhesive)	S88BL		PE
1 Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
1 Astragal (adhesive, edge mount)	S771C		PE
1 Door Wiring Harness	QC-Cxxx (hinge to device)		MK
1 Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
2 Position Switch (concealed)	By Division 28		SU
1 Power Supply	AQD6-8F8R (coord w/ Div 28)		SU
1 Card Reader	By Division 28		00

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 57.0

Description: Bldg Services; Storage

3 Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1 Storeroom Lock	ML2057 109X 97-6P GMK	CMK 626	RU
1 Door Closer (parallel arm)	MC 281 P10	EN	SA
1 Kick Plate	K1050 8" 4BE CSK	US32D	RO
1 Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1 Head & Jamb Seal (adhesive)	S88BL		PE

Set: 58.0

Description: Bldg Services; Storage Pair

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt	555	US26D	RO
1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal (adhesive)	S88BL		PE
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
1	Astragal (adhesive, edge mount)	S771C		PE

Set: 59.0

Description: Mechanical Room Sgl

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
1	Door Bottom (surface)	4301CRL		PE

Set: 60.0

Description: Mechanical Room Pair

6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt	555	US26D	RO
1	Storeroom Lock	ML2057 109X 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Kick Plate	K1050 8" 4BE CSK	US32D	RO
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Head & Jamb Seal	303AS		PE
1	Z-Bracket (to suit seal size)	BKT050SP		PE
2	Door Bottom (surface)	4301CRL		PE
1	Astragal (flatbar)	357SP (HM); 357SS (WD)		PE
1	Astragal (adhesive, edge mount)	S771C		PE

Set: 61.0

Description: Misc Door Assembly

2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Hardware	Supplied with door assembly		OT

Set: 62.0

Description: Motorized Coiling Security Grille - Card Access

2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Hardware	Supplied with door assembly		OT
2	Card Reader	By Division 28		00

Set: 63.0

Description: Misc Items; Owner Stock

6	Hinge (heavy weight)	T4A3386 QC12	US32D	MK
6	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
2	Continuous Hinge	CFM-SLF-HD1 Series		PE
2	Continuous Hinge (12-wire)	CFM-SLF-HD1 SER12 Series		PE
2	Passage Latch	ML2010 109X	626	RU
4	Classroom Intruder Lock	ML2052 109X M19N 97-6P GMK CMK	626	RU
2	Exit Device (rim, intruder, LD)	49 LD LC 8816 ETMG	US32D	SA
2	Exit Device (rim, NL, CD)	16 LC 8804	US32D	SA
2	Exit Device (rim, NL, EL, RX, CD)	16 55 56 LC 8804	US32D	SA
6	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
2	Door Closer (parallel arm)	MC 281 P10	EN	SA
2	Mortise Auto Door Bottom	434ARL ACP112BL		PE
1	Repair Kit	QC-R001		MK
1	Crimp Tool	QC-R003		MK
12	Wiring Diagram (as required)	Elevation & Point-to-Point		SA
1	Key Cabinet (per spec)	Including Set-up		OT

Set: 101.0

Description: Outdoor Toil & Storage Bldg - Exterior Gang Restroom - Card Access

1	Continuous Hinge	FM300 EL12 ETAP	630	MR
1	Mortise Lock (fail secure, RX)	ML20906-SEC 110X M92 97-6P GMK CMK	626	RU
1	Surface Closer (track, pull side)	MC 422 CTB2	EN	SA
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Threshold (coord w/ details)	172AK FHSL14SS		PE
1	Head & Jamb Seal	2891AS		PE
1	Sweep	3452APK		PE
1	Door Wiring Harness	QC-Cxxx (hinge to device)		MK
1	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1	Position Switch (concealed)	By Security Vendor		SU
1	Card Reader	By Security Vendor		00
1	Power Supply	AQD6-8F8R (coord w/ security)		SU

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override.

Set: 102.0

Description: Outdoor Toil & Storage Bldg - Exterior Toilet - Card Access; Privacy

1	Continuous Hinge	FM300 EL12 ETAP	630	MR
1	Mortise Lock (fail sec, DB, privcy)	ML20608 NAC-SEC 110X PHR 97 GMK CMK	626	RU
1	Surface Overhead Stop	9-X36	630	RF
1	Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Threshold (coord w/ details)	172AK FHSL14SS		PE

1	Head & Jamb Seal	2891AS		PE
1	Sweep	315CN		PE
1	Door Wiring Harness	QC-Cxxx (hinge to device)		MK
1	Frame Wiring Harness	QC-CxxxP (hinge/strike to J-box)		MK
1	Position Switch (concealed)	By Security Vendor		SU
1	Card Reader	By Security Vendor		00
1	Power Supply	AQD6-8F8R (coord w/ security)		SU

Notes:

Operation: Door is normally closed and locked. Valid card at reader unlocks outside lever for momentary access. Monitoring by door position switch. During a loss of power the door will default to secure. Free egress at all times. Lock status will not change when the fire detection/suppression systems are activated. Rotating inside lever will activate request to exit switch for appropriate monitor by EAC systems. Outside key override. Engaging deadbolt from inside disables card access while room is occupied.

Set: 103.0

Description: Outdoor Toil & Storage Bldg - Exterior Janitor

1	Continuous Hinge	FM300	630	MR
1	Storeroom Lock	ML2057 110X 97-6P GMK CMK	626	RU
1	Surface Overhead Stop	9-X36	630	RF
1	Door Closer (offset bracket)	MC 281 P3/P3A	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Threshold (coord w/ details)	172AK FHSL14SS		PE
1	Head & Jamb Seal	2891AS		PE
1	Sweep	315CN		PE

Set: 104.0

Description: Outdoor Toil & Storage Bldg - Exterior Storage Pair

2	Continuous Hinge	FM300	630	MR
1	Dust Proof Strike	570	US26D	RO
2	Flush Bolt	555	US26D	RO
1	Storeroom Lock	ML2057 110X 97-6P GMK CMK	626	RU
2	Surface Closer (track, pull side)	MC 422 CTB2	EN	SA
2	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
1	Threshold (coord w/ details)	172AK FHSL14SS		PE
1	Head & Jamb Seal	2891AS		PE
2	Sweep	3452APK		PE
1	Astragal	352CR		PE

Set: 105.0

Description: Outdoor Toil & Storage Bldg - Janitor

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Storeroom Lock	ML2057 110X 97-6P GMK CMK	626	RU
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

Set: 106.0

Description: Outdoor Toil & Storage Bldg - Misc Door Assembly

2	Cylinder (qty, type as required)	97 keyway 6-pin GMK CMK	626	RU
1	Hardware	Supplied with door assembly		OT

Set: 107.0

Description: Outdoor Toil & Storage Bldg - Elec Room

3	Hinge (heavy weight)	T4A3386 (qty, size, nrp per spec)	US32D	MK
1	Storeroom Lock	ML2057 110X 97-6P GMK CMK	626	RU
1	Door Closer (parallel arm)	MC 281 P10	EN	SA
1	Kick Plate	K1050 8" 4BE CSK	US32D	RO
1	Door Stop	404 wall; 441CU floor; or per spec	US26D	RO
3	Silencer	608		RO

End of Section

Section 08 80 00
GLAZING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 08 00 08)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 08 00 08 – GLASS AND GLAZING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 08 00 08.

1.2 SUMMARY

- A. The work of this Section consists of glass and glazing where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install the following:
1. Tempered glass in wood and hollow metal doors and frames.
 2. Wireless fire resistant rated glazing in designated rated doors and frames.
 3. Frameless mirrors.
 4. Glazing at School Store coordinate with Section 06 40 00 – ARCHITECTURAL WOODWORK.
 5. All materials required to properly install glass furnished hereunder, including sealant, tapes, setting blocks, and spacers.
- C. Work of this section includes installation of glazing beads furnished under related sections.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from General Contractor's or Filed Subcontractor's

failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 06 10 00 - ROUGH CARPENTRY: Installation of steel door frames.
- G. Section 06 20 00 - FINISH CARPENTRY: Installation of doors.
- H. Section 06 40 00 – ARCHITECTURAL WOODWORK: Millwork and casework to receive glazing as part of this Section.
- I. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.
- J. Section 08 00 08 – GLASS AND GLAZING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- K. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Steel doors, door and window frames, and related glazing stops, for both fire-resistance rated (labeled) and non-rated (labeled) conditions.
- L. Section 08 14 16 - FLUSH WOOD DOORS: Wood doors, and related glazing stops.
- M. Section 10 28 13 - TOILET ACCESSORIES: Framed mirrors.

1.5 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. AAMA 804.1 - Ductile Back-Bedding Compound.

2. Shapes, and Tubes.
 3. ASTM C 162 – Standard Terminology of Glass and Glass Products.
 4. ASTM C 864 – Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 5. ASTM C 1036 - Flat Glass.
 6. ASTM C 1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
 7. ASTM C 1172 – Standard Specification for Laminated Architectural Flat Glass.
 8. ASTM C 1193 – Standard Guide for Use of Joint Sealants.
 9. ASTM C 1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.
 10. ASTM E 283 - Rate of Air Leakage through Exterior Entrance and storefront, Curtains Walls and Doors.
 11. ASTM E 330 Structural Performance of Exterior Entrance and storefront, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 12. ASTM E 546 - Test Method For Frost Point of Sealed Insulating Glass Units.
 13. ASTM E 576 - Test Method for Dew/Frost Point of Sealed Insulating Glass Units in Vertical Position.
 14. ASTM E 773 - Test Method for Seal Durability of Sealed Insulating Glass Units.
 15. ASTM E 774 - Sealed Insulating Glass Units.
 16. ASTM E 1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
 17. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 18. Federal Safety Standards for Architectural Glazing Materials 16CFR1201.
 19. IGCC: Certified Products Directory, and Certification Guidelines.
 20. NFPA Publication 80 - Fire Doors and Windows.
 21. SGCC: Certified Products Directory, and Certification Guidelines.
- B. The following reference materials are hereby made a part of this Section by reference thereto:
1. GANA - Glazing Manual (2004 edition).
 2. SIGMA - Vertical Glazing Guidelines, Number A3000-87.
 3. Consumer Product Safety Commission-Safety Standard for Architectural Glazing Materials.

1.6 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed Subcontract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

1.7 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing:
 - 1. Field Measurements
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.8 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. Product data sheets on glazing products: Provide chemical, functional, and environmental characteristics, size limitations, special application requirements. Identify available colors.
 - b. Sample Warranty: Provide copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 - 2. Shop Drawings: Show sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
 - a. Plans and elevations 1/4 inch scale of each type of glazing assembly, and mirror assembly; indicate dimensions, and reference details. Verify dimensions with field measurements.
 - 3. Verification Samples:
 - a. 12 by 12 inch pieces of each specified type and thickness of glass, bearing labels indicating locations where each type of glass will be used.
 - b. Glazing tape: 12 inch length of specified type and size.
 - 4. Certificates: Manufacturer's written certification stating that the materials installed, meet or exceed the requirements specified under this Section.
 - 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required

following initial Green Building Certification Institute (GBCI) review of LEED Application.

- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.

1.9 QUALITY ASSURANCE

- A. General: Perform glazing work in accordance with GANA - Glazing Manual, FGMA Glazing Manual, SIGMA and LSGA standards for glazing and installations methods.
- 1. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
- 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in labeled, protective packages, when and as required.
- B. Storage and Handling Requirements:
- 1. Store and handle in strict compliance with manufacturer's instructions and recommendations of GANA Glazing Manual. Use clean gloves and tools when handling materials, avoid contamination. Use rolling blocks and suction cups to move glass units not in shipping crates.
 - a. Carefully store materials to avoid overloading any building component or structure.
 - b. Do not unpack material until it is to be set, unless un-packing is required for inspection by the Architect.
 - 2. Protect factory finished materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.11 SEQUENCING

- A. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed Subcontract, have been received and approved by the Architect.
- B. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of

any which are not. Do not proceed further until corrective work has been completed or waived.

1.12 SITE CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees Fahrenheit.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.13 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty/Guarantee: All shall include replacement of defective glass and mirrors, and delivery of replacement glass products furnished f.o.b. from point of manufacturer to project site.
 - 1. Insulating Glass: Manufacturer's 10 year written guarantee covering insulating glass against defects in materials and workmanship, including failure of seals effective on date of original factory shipment to site.
 - a. Provide coverage in Guarantee for manufacturing defects, including failure of hermetic seal of air space (except by glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating or other visual indications of seal failure or performance.

PART 2 - PRODUCTS

2.1 GLASS - GENERAL

- A. General requirements for glass: Of domestic and foreign manufacture, conforming to the referenced standards and with the additional requirements specified herein; factory labeled on each pane stating the strength, type, thickness and quality; with all labels remaining on glass until final cleaning.
 - 1. Glass thickness shown and heat treatment specified are minimum requirements. Provide glass thickness and heat treatment as required to meet specified performance criteria, State and local codes and ordinances.
 - 2. Provide black spacers for all insulated glass units.
 - 3. Glass thickness shown and heat treatment specified are minimum requirements. Provide glass thickness and heat treatment as required to meet specified performance criteria, State and local codes and ordinances.
 - 4. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Insulated Glass Units: Conform to Class CBA of Insulating Glass Certification Council (IGCC).
 - 1. Air space, dehydrated hermetically sealed complying with ASTM E 774.
 - 2. Provide all insulated glass with hermetically sealed black spacer bars as approved by the Architect.

- C. Float Glass: Comply with ASTM C 1036, Class 1 clear, quality q3 glazing select.
- D. Heat Strengthened Glass: Comply with ASTM C 1048 HS, heat strengthened, Class 1 clear, quality q3 glazing select.
- E. Tempered Glass: Comply with ASTM C 1048 FT, fully tempered, Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1.
 - 1. All tempered glazing units to be installed with "draw" marks in the same orientation

2.2 GLASS TYPES

- A. Glass Type A: Nominal 3/8 inch (9mm) thick clear heat strengthened glass.
 - 1. Locations: Typical at interior hollow metal borrowed lights and transoms where tempered safety glass is not required. Refer to frame type drawings and schedule for additional notes.
- B. Glass Type B: Nominal 1/4 inch (6mm) thick clear fully-tempered safety glass.
 - 1. Locations: Typical at interior hollow metal non-rated doors, frames, sidelights, transoms, and interior sliding glass display case doors. Refer to frame type drawings and schedule for additional notes.
- C. Glass Type C1: Nominal 3/8 inch (9mm) thick clear fully-tempered safety glass.
 - 1. Locations: Typical at display case shelving.
- D. Glass Type C2: Nominal 1/2 inch (9mm) thick clear fully-tempered safety glass.
 - 1. Locations: B171 Security Office.
- E. Glass Type D: 8mm-9mm thick (5/16 inch-3/8 inch) transparent wire-less fire rated ceramic glazing material with polished finish.
 - 1. Locations: Typical at labeled (fire rated) hollow metal doors; see door schedule for label requirements.
 - 2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Nippon Electric Glass Co., Ltd., "Firelite Plus".
 - b. Vetrotech Saint-Gobain, "SSG Keralite FR-L".
 - c. SAFTI First, "Pyran Platinum L".
- F. Glass Type E: Frameless mirror glass, 1/4 inch (6mm) thick:
 - 1. Size: Provide sizes shown. If not shown, provide continuous one piece mirrors from top of back splash to the underside of ceiling and extending in one piece the full length of the countertop.
 - 2. Mirror Edge Treatment: Flat polished edge.
- G. Glass Type F: Nominal 1/4 inch (6mm) thick transparent mirror glass:
 - 1. Performance Requirements: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Pilkington – NSG Group "Mirropane One-Way Mirror" having the following performance characteristics:

- a. Minimum thickness: 1/4 inch (6 mm) fully tempered glass with coating on surface 1 (subject side).
 - b. Quality: ASTM C 1376-03
 - c. Coating Requirements: 15% silver film, or approved equal
 - d. Locations: Typical at Observation Rooms to Classrooms and as indicated on Drawings.
- H. Glass Type G: Nominal 3/8 inch (9mm) thick laminated/tempered transparent mirror glass:
- 1. Performance Requirements: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Pilkington – NSG Group “Mirropane one-way mirror” having the following performance characteristics:
 - a. Composition:
 - 1) Outboard (subject side) Layer: 1/4 inch (6 mm) fully tempered glass.
 - 2) Interlayer thickness: 0.060 inch thick
 - 3) Inboard (observation side) Layer: 1/8 inch (3 mm) clear-heat strengthened glass
 - b. Quality: ASTM C 1172, 16CFR 1201, ASTM C 1376-03
 - c. Coating Requirements: 15% silver film, or approved equal
 - d. Construction for Framed Units: Laminated glass with polyvinyl butyral interlayer to comply with interlayer manufacturer’s written recommendations.
 - e. Locations: Typical at Observation Rooms to Therapeutic Planning and as indicated on Drawings.
- I. Glass Type H: Nominal 1/2 inch (14mm) thick laminated safety glass:
- 1. Composition:
 - 1) Inboard Layer: 1/4 inch (6 mm) fully tempered glass.
 - 2) Interlayer thickness: 0.060 inch thick PVB layer
 - 3) Outboard Layer: 1/8 inch (3 mm) clear-heat strengthened glass
 - b. Quality: ASTM C 1172, 16CFR 1201, ASTM C 1376-03
 - c. Construction for Framed Units: Laminated glass with polyvinyl butyral interlayer to comply with interlayer manufacturer’s written recommendations.
 - d. Location: Wellness, Weight Room and as indicated on Drawings.

2.3 FABRICATION

- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
- B. Fabricate glass as required to openings with edge clearances and bite on glass as recommended by the manufacturer with clean-cut edges where concealed, and smooth-ground, polished and seamed edges where exposed to view. Do not cut, seam, nip or abrade glass after heat-tempering.
 - 1. For non-tempered to be cut at site, provide glass larger than required so as to obtain clean cut edges without seaming or nipping.

- C. Fabricate glass with the following edge treatments.
 - 1. Exposed edges: Polished-finished radiused (penciled).
 - 2. Concealed edges: Cut edges with minimum edge work.
 - 3. Butt-joint edges: Flat round and finished with edges eased.

2.4 ACCESSORIES

- A. Glazing tape: Preformed butyl-polyisobutylene rubber with 100 percent solids contained in extruded tape roll form and complying with AAMA 804.1; coiled on release paper; of sizes required for proper glazing. equal to one of the following:
 - 1. Protective treatments 3030 or 606.
 - 2. Tremco Preshimmed 440.
 - 3. Woodmont Chem-Tape 40.
- B. Setting blocks: Neoprene, 80-90 shore A durometer hardness, certified to be "silicone compatible"; sized as follows:
 - 1. Length: 0.1 inch per square foot of glass, but not less than 4 inches.
 - 2. Width: equal to glazing rabbet space minus 1/16 inch.
 - 3. Height to suit glazing method and pane weight and area.
- C. Spacers: Neoprene, 60-80 shore A durometer hardness, black, sized as required.
- D. Glazing sealant:
 - 1. General glazing sealant: One-part medium modulus, neutral curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, grade NS, Class 25 for uses NT, G and A, FS TT-S-001543A, Type, Class A. Color as selected by Architect.
 - a. Dow Corning Corporation, Midland MI.; product, "Silicone Glazing Sealant".
 - b. General Electric Company (GE Silicones) Waterford NY.; product, "SilGlaze II SCS2800".
 - c. Tremco, Beachwood OH.; product, "Proglaze.
- E. Bond-breakers and backing materials: Type recommended by manufacturer of sealants and gaskets.
- F. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.5 ACCESSORIES FOR WIRE-LESS FIRE-RATED GLAZING

- A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent.
- B. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
 - 1. Dow Corning Corporation, Midland MI.; product, "795".

2. General Electric Company (GE Silicones) Waterford NY.; product "Silglaze-II 2800"
 3. Tremco, Beachwood OH.; product, "Spectrem 2".
- C. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

2.6 SCAFFOLDS AND STAGING

- A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contract requiring such scaffolding.
 2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.

2.7 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Inspect receiving surfaces and ensure that they are dry and free from dust, or other foreign materials before glazing. Clean all surfaces with cloth saturated with mineral spirits of high-flash naphtha as recommended by glazing tape manufacturer, before glazing.
- B. Field Measurements: Verify that field measurements are as indicated on approved Shop Drawings.
1. Check all openings, prior to glazing, to make certain that the opening is square, plumb and secure in order that uniform face and edge clearances are maintained.
 2. Determine the actual sizes required by measuring the receiving openings. Size glass and mirrors to permit required clearance and bite around full perimeter of glass, as set forth in the referenced FGMA standards, or as recommended by the glass manufacturer. Do not nip edges, to remove flares or to reduce oversize dimensions, under any circumstance.

- C. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION - DRY GLAZING

- A. Utilize dry glazing methods for field installation of glass in interior doors and frames.
 - 1. Install in vision panels in fire-rated doors and frames to requirements of NFPA 80.
 - 2. Install so that appropriate UL, Warnock Hersey, FireLite or other approval labeled markings remain permanently visible.
- B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (2 mm) above sight line.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane.
- E. Place glazing tape on free perimeter of glazing in manner as described above.
- F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- G. Knife trim protruding tape.
- H. Fill nail holes in wood framed openings to match door color and finish.

3.3 INSTALLATION - MIRRORS

- A. Examination: Verify that substrates to receive mirrors are plumb, true and of solid construction capable of supporting mirrors.
- B. Secure clips at quarter points unless otherwise detailed on the Drawings.
- C. Apply mirror mastic in accordance with manufacturer's instructions. Do not cover more than 25 percent of mirror back.
- D. Carefully adjust mirrors for perfectly plumb installations and to assure that reflected vertical and horizontal images are parallel to axis of room, and that all mirrors in any gang reflect a true and consistent image across their entire collective face. Distortion of images within any mirror panel, shifting of images, and double joints shall be corrected.
- E. Apply mirror into the clips and to the substrate so that areas not covered with mastic will remain open for ventilation with 1/8 inch minimum clearance from substrate. Secure the top edge of mirror with clips.
- F. Provide temporary rigid support until mastic sets.

3.4 PROTECTION

- A. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free of the glass. Do not apply warning markings directly to the glass.
- B. Cover glass To protect it from activities that might abrade the glass surface.

3.5 CLEANING

- A. Clean glass surfaces promptly after installation, exercising care to avoid damage to the same. Remove excess glazing tape, labels, dirt, and other contaminants.

End of Section

Section 08 88 60
FIRE-RATED GLAZING AND FRAMING SYSTEMS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 08 00 08)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 08 00 08 – GLASS AND GLAZING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 08 00 08.

1.2 SECTION INCLUDES

- A. Furnish and install the following:
 - 1. Prefinished specialized interior fire-rated glazed framing systems, of the types specified herein, all required integral reinforcing, bracing members and related accessories for the framing systems, and all angles, clips, and other items required to anchor the systems to the building structure, and as required for specified fire resistance ratings.
 - 2. Prefinished interior fire resistance framing for vision lites, with fire rated glazing.
 - 3. Prefinished fire resistance rated glazed doors with blocking for hardware.
 - 4. Prefinished "brake-metal" mullion covers, closures, flashings, etc., in conjunction with fire rated glazed framing systems.
 - 5. Shimming and fasteners required for installation.
 - 6. All wireless fire resistance rated glazing for fire rated framing systems and vision lites which are provided under this Section 08 88 60

1.3 RELATED SECTIONS

- A. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- B. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- C. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Steel doors, door and window frames, and related glazing stops, for both fire-resistance rated (labeled) and non-rated (labeled) conditions.
- D. Section 08 00 08 – GLASS AND GLAZING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- E. Section 08 80 00 - GLAZING: General requirements for glass and glazing.

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Duration of Fire Rating -- Doors: Capable of providing a fire rating for 60 minutes.

2. Duration of Fire Rating – Window/Walls: Capable of providing a fire rating for, 60 minutes.
3. Fire Resistive Rating: Glaze applications in occupancy or area separation walls and corridors where glazing exceeds 25% of the wall area, or as otherwise specified with a fire resistive assembly meeting the radiant heat requirements of ASTM E119. Per ASTM E119 and UL 263 requirements temperature on the non-fire side of glazing and framing at conclusion of fire test exposure shall be below 250°F above ambient room temperature.

1.5 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 1. ASTM E119: Methods for Fire Tests of Building Construction and Materials.
 2. ASTM E152: Methods for Fire Tests of Door Assemblies.
 3. ASTM E163: Methods for Fire Tests of Window Assemblies.
 4. NFPA 80: Fire Doors and Windows.
 5. NFPA 251: Fire Tests of Building Construction & Materials
 6. NFPA 252: Fire Tests of Door Assemblies
 7. NFPA 257: Fire Test of Window Assemblies
 8. UL 9: Fire Tests of Door Assemblies
 9. UL 10 B: Fire Tests of Window Assemblies
 10. UL 263: Fire tests of Building Construction and Materials
 11. UL 10 C: Positive Pressure Fire Tests of Window & Door Assemblies
 12. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings
 13. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 2. Shop Drawings: Show doors, frames, hardware and steel frame components as shown on shop drawings and schedules
 3. Obtain Architect's approval before fabrication.
 4. Samples for Initial Powder Coating Color Selection: For steel frames with factory-applied powder coat color finishes.
 5. Verification Samples: 12-inch square samples of glass
 6. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

7. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
- B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
- E. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- F. Certification: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
 1. Door assemblies shall be tested to the acceptance criteria of ASTM E152, NFPA 252, UL 9, UL 10C Standard Methods of Fire Tests of Door Assemblies.
 2. Wall assemblies shall be tested to the acceptance criteria of ASTM E119, NFPA 251, UL 263 Standard Test Methods for Fire Tests of Building Construction and Materials.

3. An approved independent testing laboratory equal to UL shall conduct fire test.
 - G. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by an approved independent agency maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.
 - H. Regulatory Requirements: Comply with provisions of the following:
 1. Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG).
 2. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
 - b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. Deliver, store and handle under provisions specified by manufacturer. For details on storage and product handling, please contact Technical Glass Products and request information on storage and product handling.
 - B. Deliver materials to specified destination in manufacturer or distributor's packaging undamaged, complete with installation instructions.
 - C. Store off ground, under cover, protected from weather and construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Technical Glass Products (TGP), Snoqualmie, WA, product: "Fireframes® Heat Barrier Series" frames with "Pilkington Pyrostop" glazing.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Technical Glass Products (TGP), Snoqualmie, WA, product, "Fireframes® Heat Barrier Series" with Pilkington "Pyrostop" glazing.
 2. Vetrotech Saint-Gobain, Auburn, WA, product, "VDS" with "Contraflam" glazing.
 3. SAFTI First (a division of O'Keefe's Inc.), San Francisco, CA, product "GPX" with "SuperLite II-XL" glazing.

2.2 FIRE-RESISTANCE RATED FRAMING AND GLAZING SYSTEMS

- A. General requirements:

1. Labeling: Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory (Warnock Hersey or Underwriters Laboratory), fire rating period and safety glazing standards.
 2. Glazing shall be installed in a rated framing system meeting ASTM E119.
- B. Steel Framing System: 90 minute rated:
1. Steel Frame: Profiled steel tubing permanently joined with steel bolts.
 2. Insulation: Insulate framing system against effects of fire, smoke, and heat transfer from either side. Insulate profiled steel tubing using a shell construction that incorporates Promatect-H intermediate interlayer. Firmly pack perimeter of framing system to rough opening with mineral wool fire stop insulation or appropriately rated intumescent sealant.
 3. Steel Glazing Beads: Extruded steel beads with dimensions recommended by manufacturer to securely hold glazing material in place.
 4. Fasteners: Type recommended by manufacturer.
- C. Fire rated glazing: Laminated glass with intumescent interlayers as required to match the required fire rating indicated for the framing system herein.
1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Vetrotech Saint-Gobain, "Contraflam".
 - b. Pilkington Group, "Pyrostop".
 - c. SAFTI First, "SuperLite II-XL".
 2. For fire rated door assemblies, conform with latest edition of ASTM E152, ASTM E163, NFPA-80, NFPA 252, NFPA 257.
 3. Conforms to ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 4. Permanently identify each individual glazing unit with a listing mark visible after installation.
 5. In accordance with manufacturer's specifications, glazing must be installed into frames with a similar rating, using silicone glazing compound which shall be supplied with the glazing material.

2.3 ACCESSORIES

- A. Door Hardware: door hardware scheduled and specified under Section 08 71 00 - DOOR HARDWARE to be installed under this Section 08 88 60.
- B. Glazing Accessories: Manufacturer recommended fire rated glazing accessory as follows:
1. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.
 2. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50

percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:

- a. Dow Corning 795 - Dow Corning Corp.
 - b. Silglaze-II 2800 - General Electric Co.
 - c. Spectrem 2 - Tremco Inc.
3. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.
 4. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.4 FABRICATION

- A. Framing:
 1. Steel framing: Furnish frame assemblies pre-welded when possible. Slice frames too large for shop fabrication or shipping. Fit with suitable fasteners.
- B. For certain design criteria or where job conditions require; knocked-down construction will be permitted. Furnish knock-down frames with suitable fasteners for final fabrication
- C. Field glaze door and frame assemblies.
- D. Factory prepare door assemblies field mounting of hardware.
- E. Fabrication Dimensions: Fabricate fire rated assembly to approved dimensions. Guarantee dimensions where practicable within required tolerance.
- F. Obtain approved Shop Drawings prior to fabrication.
- G. Fabrication Dimensions: Fabricate to approved dimensions. The contractor shall guarantee dimensions within required tolerance (plus or minus 1/8 inch).

2.5 FACTORY FINISHES

- A. Color Coated Finish: Apply manufacturer's standard powder coating finish system applied to factory-assembled frames before shipping, complying with manufacturer's written instructions for surface preparation including pretreatment, application, and minimum dry film thickness.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.6 SOURCE QUALITY CONTROL

- A. Source Quality: Obtain fire rated glazing products from a single manufacturer.
 1. Fabrications Dimensions: Fabricated to approved dimensions. The general contractor shall guarantee dimensions where practicable within required tolerances.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, have been previously installed under other sections, and are acceptable for product installation in accordance with manufacturer's instructions.

3.2 INSTALLATION - GENERAL

- A. Installation shall be in strict accordance with the fire-rated framing and glazing material manufacturer's specifications. Field cutting or tampering of fire-resistance rated glass is strictly prohibited.

3.3 INSTALLATION - GLAZING

- A. Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.
- B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
- C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- D. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.
- E. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.
- F. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.
- G. Place glazing tape on free perimeter of glazing in same manner described above.
- H. Install removable stop and secure without displacement of tape.
- I. Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.
- J. Install in vision panels in fire-rated doors to requirements of NFPA 80.
- K. Install so that appropriate markings remain permanently visible.

3.4 CLEANING

- A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
- B. Cleaning: Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to

owner's acceptance. Remove construction debris from project site and legally dispose of debris.

End of Section

Section 09 00 03
TILE TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements:
1. Specification requirements for the Trade Contract "TILE" include all of the following listed Specification Sections: in their entirety:
 - a. Section 09 00 03 – Tile Trade Contract Requirements.
 - b. Section 09 30 13 – Ceramic Tiling.
 - c. Section 09 30 19 – Porcelain Tiling.
 - d. Section 09 66 23 – Resinous Matrix Terrazzo
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 09 00 03 – TILE TRADE CONTRACT REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
 2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation

performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.
 2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8,

P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.

3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

- A. General: Tile Trade Contractor shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work and all other Work requiring such equipment as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor.
 - 2. Tile Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
 - 4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.2 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION (Not Used)

End of Section

Section 09 00 06
RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.
1. Specification requirements for the Trade Contract "RESILIENT FLOORING" include all of the following listed Specification Sections: in their entirety:
 - a. Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS.
 - b. Section 09 65 13 – RESILIENT BASE AND ACCESSORIES.
 - c. Section 09 65 19 – RESILIENT TILE FLOORING.
 - d. Section 09 65 23 – RUBBER FLOORING.
 - e. Section 09 65 43 – LINOLEUM FLOORING.
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:

2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
 1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.
 2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2,

FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.

3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 SUMMARY

- A. This Section includes Resilient Flooring Trade Contract Requirements and includes general requirements for preparation, installation and temporary protection of resilient flooring provided under this Trade Contract.
 1. Provide independent testing laboratory services to perform relative humidity, moisture vapor emission, and pH tests on in situ concrete slabs, which shall be in addition to testing as may be performed by Owner.
 2. Prepare substrates to receive resilient tile flooring as required to ensure specified tolerance level for finish surface of floor tile. Preparation work includes patching, smoothing and leveling substrate, including:
 - a. Grinding down high spots of substrate.
 - b. Providing Portland cement-based latex underlayment (filler).

1.4 RELATED REQUIREMENTS

- A. Section 03 33 00 – CAST-IN-PLACE CONCRETE: Concrete floor slab substrate.

- B. Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING: General requirements for preparation, installation and temporary protection for flooring work which is NOT included as part of this Trade Contract.
- C. Section 09 06 63 – WATER VAPOR EMISSION CONTROL: Application of water vapor mitigation system and related field testing.
- D. Section 09 65 23 - RUBBER FLOORING.
- E. Section 09 65 43 - LINOLEUM FLOORING.

1.5 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM D 4259 - Standard Practice for Abrading Concrete.
 - 2. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
 - 3. ASTM E 1907 - Standard Guide to Methods of Evaluating Moisture Conditions of Concrete Floors to Receive Resilient Floor Coverings
 - 4. ASTM F 710 - Preparing Concrete Floors to Receive Resilient Flooring.
 - 5. ASTM F 1482 - Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.
 - 6. ASTM F 1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 7. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
 - 8. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.6 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate flooring work with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
2. Coordinate work of this Filed-Subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
3. Coordinate the work of this Section with the respective trades responsible for installing interfacing work.

B. Pre-Installation Meetings: At least 30 calendar days prior to commencing any flooring work, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees:

- a. Owner's Project Manager.
- b. Architect.
- c. Construction Manager.
- d. Project Superintendents representing each floor system installer.
- e. Manufacturer's technical representative(s) for flooring products as designated by Architect or Contractor.
- f. Representatives of related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - 1) Section 09 65 23 - Rubber Flooring.
 - 2) Section 09 65 43 - Linoleum Flooring.

2. Agenda:

- a. Scheduling of preparation and flooring operations.
- b. Procedures for testing of relative humidity and moisture content of in situ substrates.
- c. Water vapor emission control methods.
- d. Review of staging and material storage locations.
- e. Coordination of work by other trades.
- f. Protection of completed Work.
- g. Establish humidity and temperature limitations for performing the work, to which Architect and Contractor must agree.
- h. Discuss process for inspection and acceptance of completed Work of this Section.

C. Sequencing:

1. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
2. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
3. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
4. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.
5. Field Measurements
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
6. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.8 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Test and Evaluation Reports: Include the following:
 - a. Report the Test Deployment Parameters at start of testing and finishing of testing:
 - 1) Start and finish dates and times of testing.
 - 2) Ambient temperature,
 - 3) Ambient relative humidity and dew point temperature.
 - 4) Minimum and maximum ambient temperature and relative humidity reached during testing.
 - b. Report the "Factor" used to calculate the actual test area of the Calcium Chloride test site.
 - c. Report the concrete slab thickness (in inches).
 - d. Report all test results in chart form listing the following:
 - 1) Test locations (also mark test locations on floor plan)
 - 2) Type(s) of Existing Floor Coverings
 - 3) Visual Distress Level of existing Floor Coverings
 - 4) Surface Temperature of Concrete
 - 5) pH Paper/ Pencil Reading (ASTM F 710)
 - 6) Visual Appearance of Concrete
 - 7) Concrete Slab Age
 - 8) Relative Humidity in Concrete, % (ASTM F 2170):
 - a) Depth of hole from top of Slab, in.

- b) RH in concrete, %
 - c) Temp. in concrete, °F
 - 9) Surface Moisture Meter Test (ASTM E 1907):
 - a) 1. Electrical Impedance Test Values or
 - b) 2. Electrical Resistance Test Values
 - 10) x. Moisture Vapor Emission (MVER) - CaC12 Test (ASTM F 1869):
 - a) Weight Gain in grams
 - b) Exposure Time/hrs
 - c) MVER Lbs/1000 Sq. Ft./24 hours
 - e. Report all unacceptable substrate and field conditions observed during testing.
- B. Submit 1 copy of test data to the installers of all flooring materials or floor surface coating materials scheduled to be installed.

1.9 QUALITY ASSURANCE

- A. General: perform relative humidity, moisture vapor emission (MVER) and acidity/alkalinity (pH) Testing for concrete slabs and floors.
- 1. Resilient Flooring Filed-Subcontractor shall employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the General Contractor, Resilient Flooring Filed-Subcontractor and Owner's Project Representative.
 - a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor provided under this Filed-Sub-Bid is to be installed.
 - 2. Testing Requirements: As specified under Part 3 of this Section.
 - a. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products.
 - 1) Perform additional testing after procedures have been performed by the General Contractor to reduce moisture content to ratings acceptable to the various flooring and floor-coating manufacturers. General Contractor's procedures to reduce moisture content may consist of project dehumidification and temporary heating, environmental controls, or moisture mitigation treatment to concrete.
 - 3. Testing Requirements: As specified under Part 3 of this Section.
 - a. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Additional testing shall comply with requirements and in quantities as initial tested, and be included as Work of this Trade Contract.
 - 1) Perform additional testing after procedures have been performed by the General Contractor to reduce moisture content to ratings acceptable to the various flooring and floor-coating manufacturers. General Contractor's procedures to reduce moisture content may consist of project dehumidification and temporary heating,

environmental controls, or moisture mitigation treatment to concrete.

1.10 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 GENERAL FLOORING ACCESSORIES

- A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
 - 1. Ardex Americas, Aliquippa, PA. products "Feather Flash" and "Ardex SD-P".
 - 2. Quikrete Companies., Atlanta, GA., product "Fast-Set Underlayment 1248".
 - 3. Silpro Masonry Systems Inc., Ayer MA., product "Profinish".
- B. Adhered flooring systems general requirements for adhesives (except as otherwise specified in individual Specification Sections):
 - 1. General Flooring Adhesives: High moisture resistant and alkali resistant adhesive: Synthetic Polymer, non-flammable in wet state, with NFPA, Class A rated, VOC compliant, capable of withstanding the following in continuous service:
 - a. Up to 90% relative humidity when measured in accordance with ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes.
 - b. Up to 8 lbs./1000 sq. ft./ 24 hours MVER when measured in accordance with ASTM F1869 - Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - c. VOC content: Less than 50 g/L.
 - 2. Acceptable manufacturers, or approved equal:
 - a. Advanced Adhesive Technology, Inc, Dalton GA.
 - b. DAP Incorporated, Dayton OH.
 - c. W.W. Henry Company, Aliquippa PA.
 - d. Roberts Consolidated Industries, Inc., City of Industry, CA.

- e. Or adhesive recommended by flooring manufacturer for performance and compliance with warranty requirements.

2.2 TESTING EQUIPMENT

- A. For relative humidity testing: Digital Meter and Calibrated Humidity and Temperature probe kit in Compliance with ASTM F 2170.
 - a. Minimum 2 point probe calibration.
- B. For calcium chloride testing: Anhydrous calcium chloride testing in accordance with Rubber Manufacturer's Association (RMA) Test requirements and in compliance with ASTM F 1869.
- C. For pH testing: In compliance with ASTM F710.
 - 1. pH test paper.
 - 2. Distilled or de ionized water.

2.3 SCAFFOLDS AND STAGING

- A. General: Resilient Flooring Trade Contractor shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work and all other Work requiring such equipment as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor.
 - 2. Resilient Flooring Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
 - 4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.4 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that spaces to receive flooring finishes are suitable for installation. Do not proceed with work until unsatisfactory conditions are corrected. Comply with manufacturer's recommendations including the following:
 - 1. Substrates shall be dry and clean.
 - 2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.
 - 3. Verify concrete substrates have a flat tolerance of 3/16" in 10 linear feet, or more restrictive tolerances as specified under individual resilient flooring Specification Sections included as part of this Trade Contract.
 - 4. Temperature of resilient flooring and substrate shall be within specified tolerances.
 - 5. Moisture condition and adhesive bond tests shall be performed as specified herein.

- B. For applications on concrete:
 - 1. Verify concrete substrate has been cured and is sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test
 - 2. Verify curing, hardening, or breaking compounds have not been used. If there are any, do not proceed until compounds have been removed as specified.
 - 3. For applications on concrete slab on grade or below grade, verify vapor barrier below slab was installed. If no vapor barrier was installed, do not proceed with work unless written acceptance of such conditions is received and submitted.
 - 4. Perform testing of in situ concrete, relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings as specified herein. Do not proceed with work until results of moisture condition tests are acceptable.

3.2 SURFACE PREPARATION FOR TESTING

- A. General: Substrates shall be dry and clean. Remove all dirt, debris, sealers, coatings, finishes, film-forming curing compounds, and other substances which may affect the rate of moisture dissipation. Remove all dust by vacuum or other methods. Do not use chemicals of any kind to clean concrete.
 - 1. Non-chemical methods for removal, such as abrasive grinding or bead-blasting, including methods described in ASTM D 4259 may be used on existing slabs with deleterious residues to achieve an appropriate state for testing.

- B. To test for pH at the surface of a concrete slab, use care not to over abrade the surface of the concrete which can result in overstated pH readings.

3.3 TESTING IN SITU CONCRETE SUBSTRATES

- A. Scope:

1. Provide in situ concrete relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings. Includes concrete placed as part of this Work which occurs below grade, above grade (suspended slabs), and slabs on grade.
 - a. Existing building suspended slabs may be excluded from this requirement.
- B. Scheduling:
 1. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than one, nor more than three weeks prior to scheduled flooring installation.
 - a. DO NOT conduct testing unless the slab environment is identical to that in which the finished flooring is to be installed.
 2. In the event new flooring is to be installed over existing resilient flooring, remove the portion of the existing flooring and adhesive directly under the area where testing will be conducted. Patch flooring to match existing construction after completion of testing.
- C. Test result submittals:
 1. Report all test results in chart form listing test dates, time, depth of test well, in situ temperature, relative humidity, moisture vapor and pH levels.
 2. List test locations on chart and show same on marked up Floor Plan Drawings.
 3. Submit results in duplicate. Deliver copies directly to Architect, Owner's Project Representative and General Contractor.
- D. Testing Procedures, quantification of Relative Humidity
 1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F), and 50 percent (plus or minus 10 percent) relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.
 2. The number of in situ relative humidity test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.
 3. Drill test holes utilizing a roto hammer drill. Hole diameter shall not exceed outside diameter of the insertable test sleeve by more than 0.04 inch (1mm). Drilling operation must be dry. Do not use water for cooling or lubrication; do not wet-core test hole. Determine the thickness of the concrete slab from Construction Documents. Depths of test holes shall be as follows:
 - a. For elevated slabs (not poured in pans): Drill test holes to a depth equal to 20 percent of the concrete thickness.
 - b. For slabs on grade and elevated slabs in pans: Drill test holes to a depth equal to 40 percent of the concrete thickness.
 4. Vacuum all concrete dust from test hole.

5. Insert a hole liner, or sleeve, to the full depth of test hole, assuring that the liner is capped or plugged at the end protruding from the concrete surface.
 6. Permit the test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.
 7. Remove the sleeve plug and place a probe into the sleeve assuring that it reaches the bottom of the test hole.
 8. Allow the probe to sit in the test sleeve for 30 minutes before taking readings.
 9. Read and record temperature and relative humidity at the test site.
- E. Testing Procedures, quantification of concrete moisture vapor emission through Calcium Chloride Testing:
1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent). When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.
 2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.
 3. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials. 24 hours prior to the placement of test kits.
 4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.
 5. Expose Calcium Chloride and set dish on concrete surface.
 6. Install test containment dome and allow test to proceed for 60 to 72 hours.
 7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.
 8. Weigh test dish on site recording weight and stop time.
 9. Calculate and report results as pounds of emission per 1,000 square feet per 24 hours."
- F. Testing Procedures, quantification of Acidity/Alkalinity (pH) Level:
1. At or near the relative humidity test site and each vapor emission (calcium chloride) test site, perform pH test.
 - a. At each testing site, lay down a loose 2 foot by 2 foot sheet of non perforated sheet backed by plywood. Leave in place for 48 hours.
 - b. Remove sheet and place several drops of distilled or de ionized water onto the concrete surface to form a puddle approximately 1 inches in diameter.
 - c. Allow the water to set for approximately 60 seconds.
 - d. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading

2. Record and report results.

G. Testing Procedures:

1. Initial testing: Provide 3 tests for the first 1,000 square feet.
2. Add one test for each additional 1,000 square feet.
3. Concrete surface area to be tested shall be completely clean as specified herein under Preparation.
4. Perform moisture tests in strict accordance with the kit manufacturer's Instructions. Moisture tests shall remain undisturbed for 60 to 72 hours.
5. Immediately after moisture test has been removed from test area, conduct pH test in area previously covered by plastic dome of moisture test kit.
6. After completion of tests submit 2 copies of test data to the Architect. Submit a copy of the test data to all installers of flooring materials and resinous flooring materials scheduled to be installed.
7. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

3.4 FLOORING PREPARATION – GENERAL REQUIREMENTS

- A. Close spaces to pedestrian and worker traffic during the installation of the flooring.
- B. General: Comply with ASTM F 710 and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.
1. Fill voids, cracks, and depressions with trowel-applied leveling compounds acceptable to manufacturer. Remove projections and repair other defects to tolerances acceptable to manufacturer.
 2. Remove, by light sanding and grinding, all protruding edges, high spots.
 3. Ensure substrate is flat to a plus or minus 1/8 inch in 10 feet tolerance. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
 4. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter.
 5. For concrete substrates:
 - a. Concrete floors with steel troweled (slick) finish shall be properly roughened up (sanded) to ensure suitable adhesion.
 - b. Concrete floors with curing, hardening, and breaking compounds shall be abraded with mechanical methods only to remove compounds. Use blastrac or similar equipment.
- C. Removal of existing coatings and adhesives:
1. Painted flooring substrates: Remove all existing coatings on flooring substrates. Certain paints may contain lead. Conform to federal, state and

local laws regarding appropriate methods for identifying lead-based paint and removing such paint, and notify Owner if lead-based paint has been identified.

- a. Remove existing visible lead-based paint in compliance with applicable regulations and requirements of governing agencies having jurisdiction
 - b. Isolate work areas from other workers of this project, provide air sampling results and worker exposure samples as required by referenced regulations. Contractor is responsible for worker safety and environmental exposure of contaminants during the performance of this Work.
 - c. Remove all paint chips and debris using HFOA vacuums. Dispose of caustic waste, paint chips in compliance with Resource Conservation and Recovery Act (RCRA) and all other EPA, state and local authority requirements as might be applicable.
2. In situ adhesive on flooring substrates: Use of commercial adhesive removers may adversely affect the bonding of a new flooring covering. Comply with The Resilient Floor Covering Institute (RFCI) publication "*Recommended Work Practices for Removal of Resilient Flooring Coverings*" and flooring product manufacturer's written instructions and technical advisories for removal of existing adhesives, so substrate is acceptable for new flooring installation and warranty.
 3. In situ asphalt-based adhesive on flooring substrates: Contact flooring product manufacturer's technical representative to obtain instructions for removal of existing asphalt-base adhesives so substrate is acceptable for new flooring installation and warranty.
- D. Protection of In-situ Conditions: During the operation of work of this Trade Contract, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Trade Contract, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- E. Use HEPA Vacuum to clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring. Perform vacuuming immediately prior to installation.
- F. Apply primers as recommended by adhesive manufacturer's written instructions.
- G. Condition flooring materials, accessories and adhesives to room temperatures for a period of 48 hours minimum, and as additionally required under individual Specification Sections.
- 3.5 FLOORING INSTALLATION GENERAL
- A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
 1. Apply primers as recommended by adhesive manufacturer's written instructions.

3.6 ADHESIVE BOND TESTING

- A. Use the specified flooring and recommended adhesive, install approximately 36 by 36 inch sized flooring as specified under individual flooring specification sections. Install test samples approximately 50 feet apart throughout the area, but not less than 1 test per 1000 square feet. Areas next to walls or other light traffic areas should be selected for the bond test. Tape down the perimeter of the flooring to prevent drying of the adhesive at the edges. After a minimum period of 72 hours the flooring should be pulled from the subfloor. If an unusual amount of force is required, the bond could be considered sufficient. Floors demonstrating unsuitable bond to substrate require modifications to flooring installation and may require application of moisture mitigation products. Review all conditions with Architect/Engineer.

3.7 PROTECTION

- A. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all floor surfaces with heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection.

End of Section

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Section 09 00 09
PAINTING TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements:
1. Specification requirements for the Trade Contract "PAINTING" include all of the following listed Specification Sections: in their entirety:
 - a. Section 09 00 09 – PAINTING TRADE CONTRACT REQUIREMENTS.
 - b. Section 09 91 00 – PAINTING.
 - c. Section 09 91 13 – EXTERIOR PAINTING SCHEDULE.
 - d. Section 09 91 23 – INTERIOR PAINTING SCHEDULE.
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 09 00 09 – PAINTING TRADE CONTRACT REQUIREMENTS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
 2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation

performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.
 2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8,

P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3, TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.

3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 QUALITY ASSURANCE

- A. Company specializing in work described in the above listed individual specification sections with minimum 5 years documented experience.

1.5 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

- A. General: Painting Trade Contractor shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work and all other Work requiring such equipment as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor.
 - 2. Painting Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.
 - 4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.2 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION (Not Used)

End of Section

Section 09 05 60
COMMON WORK RESULTS FOR FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general requirements for flooring preparation, installation and temporary protection.
 - 1. Provide independent testing laboratory services to perform relative humidity, moisture vapor emission, and pH tests on in situ concrete slabs, which shall be in addition to testing as may be performed by Owner.
 - 2. Prepare substrates to receive flooring as required to ensure specified tolerance level for finish surface of all work required by this TRADE CONTRACT. Preparation work includes patching, smoothing and leveling substrate, including:
 - a. Grinding down high spots of substrate.
 - b. Providing portland cement-based latex filler.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 09 65 43 - LINOLEUM FLOORING: Linoleum flooring.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
1. ASTM D 4259 - Standard Practice for Abrading Concrete.
 2. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
 3. ASTM E 1907 - Standard Guide to Methods of Evaluating Moisture Conditions of Concrete Floors to Receive Resilient Floor Coverings
 4. ASTM F-710 - Preparing Concrete Floors to Receive Resilient Flooring.
 5. ASTM F-1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 6. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
 7. ASTM F 3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.
 8. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. General: Coordinate flooring work with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Pre-Installation Meetings: At least 30 calendar days prior to commencing any flooring work, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
1. Required attendees:
 - a. Architect.
 - b. Construction Manager.
 - c. Project Superintendents representing each floor system installer.
 - d. Manufacturer's technical representative(s) for flooring products as designated by Architect or Contractor.
 - e. Representatives of related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - 1) Section 03 05 13 Concrete Sealers.

- 2) Section 09 64 66 – Wood Athletic Flooring.
- 3) Section 09 61 03 – Water Vapor Emission Control.
- 4) Section 09 65 66 - Resilient Athletic Flooring.
- 5) Section 09 67 23 - Resinous Flooring.
- 6) Section 09 68 13 – Tile Carpeting.
- 7) Section 09 68 16 – Sheet Carpeting.

C. Sequencing:

1. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
2. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Test and Evaluation Reports: Include the following:
 - a. Report the Test Deployment Parameters at start of testing and finishing of testing:
 - 1) Start and finish dates and times of testing.
 - 2) Ambient temperature,
 - 3) Ambient relative humidity and dew point temperature.
 - 4) Minimum and maximum ambient temperature and relative humidity reached during testing.
 - b. Report the "Factor" used to calculate the actual test area of the Calcium Chloride test site.
 - c. Report the concrete slab thickness (in inches).
 - d. Report all test results in chart form listing the following:
 - 1) Test locations (also mark test locations on floor plan)
 - 2) Surface Temperature of Concrete
 - 3) pH Paper/ Pencil Reading (ASTM F 710)
 - 4) Visual Appearance of Concrete
 - 5) Concrete Slab Age
 - 6) Relative Humidity in Concrete, % (ASTM F 2170):
 - a) Depth of hole from top of Slab, in.
 - b) RH in concrete, %
 - c) Temp. in concrete, °F
 - 7) Surface Moisture Meter Test (ASTM E 1907):
 - a) 1. Electrical Impedance Test Values or
 - b) 2. Electrical Resistance Test Values
 - 8) x. Moisture Vapor Emission (MVER) - CaC12 Test (ASTM F 1869):
 - a) Weight Gain in grams

- b) Exposure Time/hrs
 - c) MVER Lbs/1000 Sq. Ft./24 hours
 - e. Report all unacceptable substrate and field conditions observed during testing.
2. LEED Submittal Requirements:
- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Submit 1 copy of test data to the installers of all flooring materials or floor surface coating materials scheduled to be installed.
- 1.6 QUALITY ASSURANCE
- A. General: perform relative humidity, moisture vapor emission (MVER) and acidity/alkalinity (pH) Testing for concrete slabs and floors.
- 1. The Construction Manager shall employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the Construction Manager, non-trade flooring subcontractors and Owner's Project Manager.
 - a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor is to be installed. This includes, but is not limited to:
 - 1) Wood flooring of all types.
 - 2) Resilient athletic flooring of all types.
 - 3) Resinous flooring and seamless flooring of all types.
 - 4) Carpet flooring of all types.
 - 5) Concrete sealers.
 - b. Perform moisture and pH tests on all concrete floors over-which stone flooring is to be applied.
 - 2. Testing Requirements: As specified under Part 3 of this Section.
 - a. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products.
 - 1) Resilient Flooring Trade Contractor shall perform additional testing after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and floor coating manufacturers. Procedures to reduce moisture content may consist

of project dehumidification and temporary heating, environmental controls, or moisture mitigation treatment to concrete.

- 1.7 RELATIVE HUMIDITY, MOISTURE VAPOR EMISSION AND ACIDITY/ALKALINITY (PH) TESTING
- A. Concrete slabs and floors:
1. Resilient Flooring Trade Contractor shall employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the Construction Manager, and Owner's Project Manager.
 - a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over which a finished floor is to be installed. This includes, the following floor finishes that are part of the work of this Trade Contract
 - 1) Resilient sheet flooring, including linoleum flooring.
 - 2) Resilient tile and plank flooring, including vinyl composite flooring.
 2. Requirements: As specified under Part 3 of this Section.
 - a. Submit 1 copy of test data to the installers of all flooring materials or coating materials scheduled to be installed.
 - b. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

PART 2 - PRODUCTS

- 2.1 GENERAL FLOORING ACCESSORIES
- A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex Americas, Aliquippa, PA., products "Feather Flash" and "Ardex SD-P".
 2. Quikrete Companies., Atlanta, GA., product "Fast-Set Underlayment 1248".
 3. Silpro Corp., Ayer MA., product "Profinish".
- B. Adhered flooring systems general requirements for adhesives (except as otherwise specified in individual Specification Sections):
1. General Flooring Adhesives: High moisture resistant and alkali resistant adhesive: Synthetic Polymer, non-flammable in wet state, with NFPA, Class A rated, VOC compliant, capable of withstanding the following in continuous service:
 - a. Up to 90% relative humidity when measured in accordance with ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes.

- b. Up to 8 lbs./1000 sq. ft./ 24 hours MVER when measured in accordance with ASTM F1869 - Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - c. VOC content: Less than 50 g/L.
 2. Acceptable manufacturers, or approved equal:
 - a. Advanced Adhesive Technology, Inc, Dalton GA.
 - b. DAP Incorporated, Dayton OH.
 - c. W.W. Henry Company, Aliquippa PA.
 - d. Roberts Consolidated Industries, Inc., City of Industry, CA.
 - e. Or adhesive recommended by flooring manufacturer for performance and compliance with warranty requirements.
 - C. Accessories:
 1. Primers: Unless otherwise recommended by cementitious underlayment and patching mortar manufacturer for substrate material, condition, and porosity encountered:
 - a. Ardex: "P-51".
 - b. Pro Spec: "Level Set Primer".
 - c. Silpro: "C 21 All Acrylic".
 2. Cleaning agent: Commercial Muriatic acid.
- 2.2 TESTING EQUIPMENT
 - A. For relative humidity testing: Digital Meter and Calibrated Humidity and Temperature probe kit in Compliance with ASTM F 2170.
 - a. Minimum 2 point probe calibration.
 - B. For calcium chloride testing: Anhydrous calcium chloride testing in accordance with Rubber Manufacturer's Association (RMA) Test requirements and in compliance with ASTM F 1869.
 - C. For pH testing: In compliance with ASTM F710.
 1. pH test paper.
 2. Distilled or de ionized water.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that spaces to receive flooring finishes are suitable for installation. Do not proceed with work until unsatisfactory conditions are corrected. Comply with manufacturer's recommendations including the following:
 1. Substrates shall be dry and clean.
 2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.
 3. Verify concrete substrates have a flat tolerance of 3/16 inch in ten linear feet.

4. Temperature of resilient flooring and substrate shall be within specified tolerances.
 5. Moisture condition and adhesive bond tests shall be performed as specified herein.
- B. For applications on concrete:
1. Verify concrete substrate has been cured and is sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test
 2. Verify curing, hardening, or breaking compounds have not been used. If there are any, do not proceed until compounds have been removed as specified.
 3. For applications on concrete slab on grade or below grade, verify vapor barrier below slab was installed. If no vapor barrier was installed, do not proceed with work unless written acceptance of such conditions is received and submitted.
 4. Perform testing of in situ concrete, relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings as specified herein. Do not proceed with work until results of moisture condition tests are acceptable.

3.2 SURFACE PREPARATION FOR TESTING

- A. General: Substrates shall be dry and clean. Remove all dirt, debris, sealers, coatings, finishes, film-forming curing compounds, and other substances which may affect the rate of moisture dissipation. Remove all dust by vacuum or other methods. Do not use chemicals of any kind to clean concrete.
1. Non- chemical methods for removal, such as abrasive grinding or bead-blasting, including methods described in ASTM D 4259 may be used on existing slabs with deleterious residues to achieve an appropriate state for testing.
- B. To test for pH at the surface of a concrete slab, use care not to over abrade the surface of the concrete which can result in overstated pH readings.

3.3 TESTING IN SITU CONCRETE SUBSTRATES

- A. Scope:
1. Provide in situ concrete relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings. Includes concrete placed as part of this Work which occurs below grade, above grade (suspended slabs), and slabs on grade.
- B. Scheduling:
1. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than one, nor more than three weeks prior to scheduled flooring installation.
 - a. DO NOT conduct testing unless the slab environment is identical to that in which the finished flooring is to be installed.
- C. Test result submittals:

1. Report all test results in chart form listing test dates, time, depth of test well, in situ temperature, relative humidity, moisture vapor and pH levels.
 2. List test locations on chart and show same on marked up Floor Plan Drawings.
 3. Submit results in duplicate. Deliver copies directly to Architect, Owner's Project Representative and Construction Manager General Contractor.
- D. Testing Procedures, quantification of Relative Humidity
1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F), and 50 percent (plus or minus 10 percent) relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.
 2. The number of in situ relative humidity test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.
 3. Drill test holes utilizing a roto hammer drill. Hole diameter shall not exceed outside diameter of the insertable test sleeve by more than 0.04 inch (1mm). Drilling operation must be dry. Do not use water for cooling or lubrication; do not wet-core test hole. Determine the thickness of the concrete slab from Construction Documents. Depths of test holes shall be as follows:
 - a. For elevated slabs (not poured in pans): Drill test holes to a depth equal to 20 percent of the concrete thickness.
 - b. For slabs on grade and elevated slabs in pans: Drill test holes to a depth equal to 40 percent of the concrete thickness.
 4. Vacuum all concrete dust from test hole.
 5. Insert a hole liner, or sleeve, to the full depth of test hole, assuring that the liner is capped or plugged at the end protruding from the concrete surface.
 6. Permit the test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.
 7. Remove the sleeve plug and place a probe into the sleeve assuring that it reaches the bottom of the test hole.
 8. Allow the probe to sit in the test sleeve for 30 minutes before taking readings.
 9. Read and record temperature and relative humidity at the test site.
- E. Testing Procedures, quantification of concrete moisture vapor emission through Calcium Chloride Testing:
1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent). When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording

conditions during the test period. A transcript of this information must be included with the test report.

2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.
3. Test sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials. 24 hours prior to the placement of test kits.
4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.
5. Expose Calcium Chloride and set dish on concrete surface.
6. Install test containment dome and allow test to proceed for 60 to 72 hours.
7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.
8. Weigh test dish on site recording weight and stop time.
9. Calculate and report results as pounds of emission per 1,000 square feet per 24 hours."

F. Testing Procedures, quantification of Acidity/Alkalinity (pH) Level:

1. At or near the relative humidity test site and each vapor emission (calcium chloride) test site, perform pH test.
 - a. At each testing site, lay down a loose 2 foot by 2 foot sheet of non perforated sheet backed by plywood. Leave in place for 48 hours.
 - b. Remove sheet and place several drops of distilled or de ionized water onto the concrete surface to form a puddle approximately 1 inches in diameter.
 - c. Allow the water to set for approximately 60 seconds.
 - d. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading
2. Record and report results.

G. Testing Procedures:

1. Initial testing: Provide 3 tests for the first 1,000 square feet.
2. Add one test for each additional 1,000 square feet.
3. Concrete surface area to be tested shall be completely clean as specified herein under Preparation.
4. Perform moisture tests in strict accordance with the kit manufacturer's Instructions. Moisture tests shall remain undisturbed for 60 to 72 hours.
5. Immediately after moisture test has been removed from test area, conduct pH test in area previously covered by plastic dome of moisture test kit.
6. After completion of tests submit 2 copies of test data to the Architect. Submit a copy of the test data to all installers of flooring materials and resinous flooring materials scheduled to be installed.
7. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional

testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

3.4 FLOORING PREPARATION – GENERAL REQUIREMENTS

- A. Close spaces to pedestrian and worker traffic during the installation of the flooring.
- B. General: Comply with ASTM F 710 and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.
 - 1. Fill voids, cracks, and depressions with trowel-applied leveling compounds acceptable to manufacturer. Remove projections and repair other defects to tolerances acceptable to manufacturer.
 - 2. Remove, by light sanding and grinding, all protruding edges, high spots.
 - 3. Ensure substrate is flat to a plus or minus 1/8 inch in 10 feet tolerance. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
 - 4. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter.
 - 5. For concrete substrates:
 - a. Concrete floors with steel troweled (slick) finish shall be properly roughened up (sanded) to ensure suitable adhesion.
 - b. Concrete floors with curing, hardening, and breaking compounds shall be abraded with mechanical methods only to remove compounds. Use blastrac or similar equipment.
- C. Protection of In-situ Conditions: During the operation of flooring work, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all surfaces which are soiled or otherwise damaged by Work, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- D. Use HEPA Vacuum to clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring. Perform vacuuming immediately prior to installation.
- E. Apply primers as recommended by adhesive manufacturer's written instructions.
- F. Condition flooring materials, accessories and adhesives to room temperatures for a period of 48 hours minimum, and as additionally required under individual Specification Sections.

3.5 FLOORING INSTALLATION GENERAL

- A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
 - 1. Apply primers as recommended by adhesive manufacturer's written instructions.

3.6 ADHESIVE BOND TESTING

- A. Use the specified flooring and recommended adhesive, install approximately 36 by 36 inch sized flooring as specified under individual flooring specification sections. Install test samples approximately 50 feet apart throughout the area, but not less than 1 test per 1000 square feet. Areas next to walls or other light traffic areas should be selected for the bond test. Tape down the perimeter of the flooring to prevent drying of the adhesive at the edges. After a minimum period of 72 hours the flooring should be pulled from the subfloor. If an unusual amount of force is required, the bond could be considered sufficient. Floors demonstrating unsuitable bond to substrate require modifications to flooring installation and may require application of moisture mitigation products. Review all conditions with Architect,./.

3.7 PROTECTION

- A. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all floor surfaces with heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection.
 - 1. Remove floor protection when directed by Construction Manager and dispose of in dumpster provided by Construction Manager.

End of Section

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Section 09 05 63
MOISTURE VAPOR EMISSION CONTROL

PART 1 – GENERAL

1.1 SUMMARY

- A. Furnishing, application and installation testing, of water vapor transmission reduction and alkalinity control system for interior concrete slab construction (suspended slabs, and slabs-on-grade) having water vapor transmission which is greater than as recommended by flooring finish material manufacturers, for the flooring finishes specified under the related specification sections, referenced herein.
- B. Areas Not Requiring Vapor Reduction System:
 - 1. Anhydrous calcium chloride testing performed by the Contractor under the requirements of Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING for interior concrete slab areas receiving finish flooring indicated herein above shall initially determine where this system will be required. Water vapor transmission reduction system will be required on concrete floors with transmission levels as low as 3 pounds/24 hours per 1,000 square foot and when recommended by flooring system manufacturer or their approved adhesive manufacturer as applicable.
 - 2. Water vapor reduction system is not required on interior concrete slabs with tested transmission levels less than 3 pounds/24 hours per 1,000 square foot.
 - 3. Water vapor reduction system is not required on interior concrete slabs without floor finishes.
- C. Water vapor emission controls become necessary as result of the Contractor's own means and methods regarding water content in slabs, curing of poured slabs, protection of slabs, methods for drying slabs, temporary weather enclosures, temporary heat and dehydration, construction scheduling and sequencing of the Work and similar means and methods issues. Therefore all costs for Water Vapor Emission Controls shall be included in the Contract Price, and installed at no additional costs to the Owner.

1.2 RELATED REQUIREMENTS

- A. Section 01 51 00 – CONSTRUCTION INDOOR AIR QUALITY: Indoor air quality management plan.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 00 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedure requirements related to the Owner's LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
1. All applicable federal, state and municipal codes, laws and regulations for exits.
 2. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials
 3. ASTM F 1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 4. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes.
 5. ASTM F 710 – Standard Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate work of this Section with the all flooring trades responsible for installing flooring systems applied over the work of this Section for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Pre-Installation Meetings: At least six weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named herein.
1. Required attendees: Owner's Project Manager, Architect, Construction Manager, Installer's Project Superintendent, manufacturer's technical representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - a. Section 09 00 06 – Resilient Flooring Trade Contract Requirements.
 - b. Section 09 05 06 - Common Work Results for Flooring.
 2. Agenda:
 - a. Testing procedures.
 - b. Scheduling of water vapor mitigation operations.
 - c. Review of vapor pressure rates acceptable to flooring manufacturers for specified products.
 - d. Review of staging and material storage locations.
 - e. Coordination of work by other trades.
 - f. Establish working temperature conditions to which Architect and Contractor must agree.

- g. Discuss process for inspection and acceptance of completed Work of this Section.
- C. Sequencing:
 - 1. Field Measurements for unit price work:
 - a. Following testing of concrete slabs, take field measurements and provide marked up drawings indicating each location of moisture vapor mitigation system, and size (in square feet) of each application. Submit marked up drawings with request for payment for unit price work.
- D. Scheduling:
 - 1. Apply moisture mitigation system after concrete slabs are cured, and prepared and tested as specified under Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING.
 - 2. Apply moisture mitigation system prior to installation of flooring. Allow a minimum cure time after installation of water vapor transmission reduction system top coat of 12 hours before application of any finish material.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Include for vapor transmission mitigation products: chemical, functional, and environmental characteristics, size limitations, special application requirements.
 - b. Include certification of data indicating Volatile Organic Compound (VOC) content of all components of vapor transmission mitigation system.
 - 2. Shop Drawings: Provide marked-up floor plans indicating locations where moisture mitigation system is to be applied. Include indications of square footages based on actual job site measurements.
 - 3. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
 - 4. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 - 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product

Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 - 1. Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.
 - a. As-built Drawings to include where water moisture mitigation system has been applied, along with initial Anhydrous calcium chloride testing results.
 - 2. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture vapor.
- 1.6 QUALITY ASSURANCE
- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of moisture mitigation system.
 - C. Qualifications:
 - 1. Applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and having current license by product manufacturer.
 - D. Preconstruction Testing: Calcium chloride testing as specified herein.
- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
 - B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Store products in an approved ventilated dry area; protect from dampness, freezing, and direct sun light. Product should not be stored in areas with temperatures in excess of 90 °F or below 50 °F.
- 1.8 SITE CONDITIONS
- A. Maintain substrate surface temperature above 50 degrees Fahrenheit for 24 hours before, during, and after installation of water vapor emission mitigation work.

1.9 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty: Provide manufacturer's written warranty signed by water vapor emission control system manufacturer and installer covering work of this Section, including removing and reinstalling flooring system and all related labor charges, for a period of 10 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Koester American Corporation, Product: "KoesterVAP I® 2000 System".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products are limited to the following:
 - 1. Koester American Corporation, Virginia Beach, VA, product "Koester VAP 2000".
 - 2. Ardex Engineered Cements, Aliquippa, PA, product "Ardex MC".
 - 3. Düraamen Engineered Products Inc., New York, NY, product "MVT."
 - 4. Tnemec, Kansas City, MO., Series "241-MVT."

2.2 MATERIALS

- A. General: Use materials of one manufacturer throughout the project as hereinafter specified.
- B. Water-based primer/curing agent, 100% solids coating, containing specifically formulated chemicals and resins to provide the following characteristics and properties.
 - 1. ASTM E 96, Water Vapor Transmission (dry and wet methods) Performance shall be documented by an independent testing laboratory at a minimum 90% water vapor transmission reduction compared to untreated ACI Committee 201 durable concrete.
 - 2. Certify acceptance and exposure to continuous topical water exposure after final cure.
 - 3. The system consists of a minimum of one coat of primer and one coat of curing agent applied to a properly prepared concrete surface. Anhydrous calcium chloride testing performed by the Contractor having water vapor transmission levels greater than 3 lbs/24hrs. per 1000/sf. and less than 25 lbs/24 hrs per 1,000/sf. (depending on individual conditions) shall determine where this system is utilized and the coverage rates required. The water vapor reduction system shall be required to reduce vapor emissions by a minimum of 90% after final cure. Verify water vapor reduction by anhydrous calcium chloride testing according to ASTM F 1869 prior to proceeding with any floor covering installation.

- C. Cementitious underlayment: Factory blended cement and polymer-based, self-drying, self leveling applied cementitious underlayment for conditions up to 1-1/2 inches thick compatible with water vapor emission control system, having the following performance characteristics:
1. Working Time: At least 30 minutes at 70°F.
 2. Compressive Strength: ASTM C109, minimum 5,500 psi after 28 days.
 3. Tensile Strength: ASTM C190, minimum 570 psi after 28 days.
 4. Flexural Strength: ASTM C348, minimum 1,200 psi after 28 days.
 5. Shear Bond Strength: ASTM C1042, minimum 1,540 psi after 28 days.
 6. Acceptable products:
 - a. Ardex Americas, Aliquippa, PA., product: "SD-T".
 - b. H.B. Fuller Construction Products, Aurora IL., ProSpec brand, product: "Level Set 300".
 - c. Silpro Corp., Ayer MA., product: "Silflo 230".

2.3 ACCESSORIES

- A. Primer for underlayment: Unless otherwise recommended by cementitious underlayment and patching mortar manufacturer for substrate material, condition, and porosity encountered:
1. Ardex Americas, Aliquippa, PA., product: "P-51".
 2. H.B. Fuller Construction Products, Aurora IL., ProSpec brand, product: "Level Set Primer".
 3. Silpro Corp., Ayer MA., product: "C 21 All Acrylic".
- B. Aggregate: Well graded washed gravel 1/8 inch to 1/4 inch or larger for use in preleveling or when topping material is over 2 inches thick.
- C. Water: Clean, potable and not exceeding 70° F.

2.4 MIX DESIGNS

- A. Use clean containers and mix thoroughly as per manufacturer's requirements to obtain a homogeneous mixture. Use a low speed motor less than 400 rpm and a two bladed jiffy mixing blade only. Do not aerate. Mix ratios are measured by volume.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Do not apply water vapor reduction system to unprotected surfaces or when water is accumulated on the surface of the concrete.
 2. Confirm uncontaminated, absorptive, sound surface. Report any conditions that prevent application to the Contractor .

3. Inspect all surfaces with regard to their suitability to receive moisture vapor reduction system with vapor reduction coating system by Manufacturer's Representative.
 4. Make sure that surfaces to be treated with water vapor reduction system have not previously been treated with other materials like underlayments, screeds, penetrating sealants, etc. If this is the case, consult with the manufacturer prior to any application of water vapor reduction system.
 5. Beginning of installation means acceptance of existing substrate and project conditions.
- B. Preinstallation Testing:
1. Calcium chloride test requirements:
 - a. Anhydrous calcium chloride testing shall be performed by the Contractor as outlined in Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING, and in compliance with ASTM F 1869. Tests shall be installed onto freshly abraded contaminant free concrete. No exceptions.
 - b. Only conduct calcium chloride tests at the same temperature and humidity expected during normal use. If this is not possible, then the test conditions should be 75° F +/- 10° F and 50+- 10% relative humidity. Maintain these conditions 48 hours prior to and during tests. Water vapor transmission levels are directly affected by ambient room temperature and readings conducted without a sustained ambient temperature are not acceptable.
 - c. Contractor shall provide test results with a marked up floor finish plan showing test results. Contractor will provide a written clarification on status of the ambient air temperature and humidity before and during the testing procedures.
 - d. Contractor will provide a marked up floor plan showing areas with vapor reduction system recommendations.
 2. Initial calcium chloride tests:
 - a. Before installation of finish flooring over interior concrete slabs, the Contractor's testing laboratory will make known the level of water vapor transmission in the slab in accordance to ASTM F1869 to all parties involved. The Contractor's testing laboratory will document the test results and provide recommendations on the type of Water vapor reduction system to be utilized.
 3. Floor treatment calcium chloride tests:
 - a. After proper cure of the final coat of the water vapor reduction system the Contractor's testing laboratory shall provide calcium chloride tests to determine if the level of water vapor transmission and alkalinity are reduced to specified levels in conjunction with the flooring manufacturers installation requirements.
 4. Adhesion tests:
 - a. The Contractor's testing laboratory will verify proper adhesion of flooring adhesives, coatings, and leveling compounds to the final vapor reduction coating system for acceptability. Contact Manufacturer's Representatives for recommendations.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- B. Surface Preparation: Clean all surfaces to receive water vapor reduction system. Shotblast all floors and vacuum clean surfaces to remove all residue off the substrate. Remove defective materials, and foreign matter such as dust, adhesives, leveling compounds, paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, shotblast bee bees, etc. Inform vapor reduction system manufacturer if concrete additives like chlorides or any other soluble compounds that can contaminate surfaces have been used in the concrete mix. Reinforcing fibers must be burned off, scraped and vacuumed. Remove, after shotblasting, leaving no fibers left on the concrete surfaces.
- C. Only a surface substrate that remains uncontaminated, absorbtive, and sound shall be considered fit to receive a water vapor reduction system. Comply with all requirements as listed in manufacturer's technical data information.

3.3 APPLICATION

- A. System Application:
 - 1. The coverage rates for the single coat system depend on the surface texture and porosity of the substrate as well as the measured level of moisture from Section 3.1 Examination.
 - 2. Apply one coat of water vapor emission control at an average coverage rate of 90 to 130 square feet per gallon or as otherwise recommended by the manufacturer using a squeegee and or a 3/8-inch nap roller leaving no areas untreated. Allow to cure a minimum of 12 hours.
- B. Primer System Application:
 - 1. Dampen uncontaminated concrete surface leaving no standing water. Surfaces must be damp, not wet to the touch. Always use clean potable water to pre-dampen concrete surfaces. Only pre-dampen concrete prior to the first primer coat. Do not pre-dampen between subsequent coats of the water vapor emission control.
 - 2. Spray primer leaving no areas untreated. Back brush thoroughly.
 - 3. Avoid puddling and pinholes when back brushing.
 - 4. Provide continuous ventilation and air movement during curing process. No exceptions.
 - 5. Apply first primer coat at a rate of 250 square feet per gallon and allow to cure a minimum of 6 hours.
 - 6. Apply one coat of water vapor emission control at an average coverage rate of 90 to 130 square feet per gallon using a squeegee and or 3/8-inch nap roller leaving no areas untreated. Allow to cure a minimum of 12 hours.

- C. A cementitious underlayment system with an approved epoxy primer shall be used to level and smooth surfaces after shotblasting the floor and on top of the water vapor reduction system. The underlayment system utilized must be tested and approved by the adhesive manufacturer of the finish flooring prior to installation. No underlayment system containing gypsum will be allowed. When water based adhesives are utilized in the floor covering installation, use an approved underlayment system with primer prior to the installation of the flooring system. Consult the adhesive manufacturer for their minimum recommended thickness of cementitious underlayment to absorb excess moisture in the adhesive. Leveling of the substrate shall not be considered part of the water vapor reduction system.
- D. For installation of resilient flooring directly over the water vapor reduction system, the contractor responsible for installing the floor covering system shall use 100% solids adhesives and or contact type adhesives with long working times that can be applied to substrates with a pH up to 10. The method of use is to apply the contact type adhesives to the substrate and allow the materials water to flash off prior to the flooring installation. Always test proper adhesion of adhesive to water vapor reduction system prior to installation of entire flooring systems. No exceptions.
- E. Control spills of fluid applied materials: Do not allow material to saturate ground, enter drains, runoffs, streams, lakes or ground water. Immediately absorb all spills with a dry inert material, such as sand or manufactured absorbents. Properly dispose of absorbent materials in compliance with all environmental regulations.
 - 1. Report all spills into, or with the potential to reach, navigable (surface) waters of the United States or adjoining shorelines, as soon as there is knowledge of the spill, to the National Response Center. The criteria for reporting such incidents were set forth in 40 CFR 110 for oil discharges and 40 CFR 116 for hazardous substances discharges.

National Response Center
c/o United States Coast Guard (G-OPF) - Room 2611
2100 2nd Street, Southwest
Washington, DC 20593-0001

Toll Free Telephone: 800-424-8802

3.4 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- B. Clean work under provisions of Section 01 70 00 – EXECUTION.
- C. Waste Management:
 - 1. Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
 - 2. Dispose of liquid waste in accordance with all applicable regulations. Consult all regulations (federal, provincial, state, local) or a qualified waste disposal firm when characterizing waste for disposal. Contact manufacturer for MSDS sheets for product information, and recommendations for proposal disposal.

Utilize licensed waste disposal companies as may be required, the following phone numbers for national companies are provided for the Contractor's convenience only.

- a. Safety Kleen, Plano TX., (telephone 800-669-5740).
- b. Clean Harbors, Norwell MA., (telephone 800-422-8998).
- c. Phillip Services Corporation (PSC), Houston TX., (telephone 800-726-1300).

3.5 PROTECTION

- A. General: Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
- B. Protect each coat during specified cure period from any kind of traffic, topical water, and contaminants.
- C. Protect applied water vapor mitigation system to prevent damage from active rain or topical water for a minimum period of 24 hours from time of application.

End of Section

Section 09 21 17
SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install shaft wall systems including framing, liner and board finish components.
 - 1. Gypsum Board taping and finishing are specified under Section 09 29 00 – GYPSUM BOARD.
- B. Install access panels occurring in shaft walls, furnished by Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 05 40 00 - COLD-FORMED METAL FRAMING: Load bearing framing.
- F. Section 06 10 00 - ROUGH CARPENTRY:
 - 1. Supplemental wood blocking.
 - 2. Installation of metal door frames in shaft wall systems.
- G. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.

- H. Section 07 95 13 - EXPANSION JOINT COVER ASSEMBLIES: Prefinished joint assemblies for floors, walls and ceiling/soffit surfaces.
- I. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.
- J. Section 09 51 00 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceiling including suspension system and associated edge moldings.
- K. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-load bearing partition and ceiling framing and furring.
- L. Section 09 29 00 - GYPSUM BOARD: Gypsum board finishes, applied over work of this Section 09 21 17, including: joint treatment, joint compound finishing and related trim components.
- M. Section 09 81 00 – ACOUSTICAL INSULATION: Acoustical batt insulation.
- N. Section 09 91 00 - PAINTING: Applied finish coatings.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 475 - Joint Treatment Materials for Gypsum Wallboard Construction.
 - 2. ASTM C 754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board.
 - 3. ASTM C 919 - Use of Sealants in Acoustical Applications.
 - 4. ASTM C 1047 - Accessories for Gypsum wall board and veneer base.
 - 5. ASTM C 1396 - Gypsum Wallboard.
 - 6. ASTM E 90 - Method of Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
 - 7. ASTM E 119 - Fire Tests of Building Construction and Materials.
 - 8. GA 201 - Gypsum Board for Walls and Ceilings.
 - 9. GA 214 - Recommended Specifications for Levels of Gypsum Board Finish.
 - 10. GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
 - 11. All applicable federal, state and municipal codes, laws and regulations for fire rated assemblies.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
 - 2. Work of this Section shall be closely coordinated with the work of Section 09 29 00 - GYPSUM BOARD, to assure the steady progress of the Contract.

- B. Sequencing: Do not install shaft wall until all pipes, ducts, conduits, and other such items which are to be enclosed thereby, have been permanently installed, inspected and approved.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 - 2. Shop Drawings:
 - a. Details of any special conditions associated with fireproofing.
 - b. Mark-up a set of blackline interior elevations indicate corrections to grid layout and provide dimensioning showing locations of all proposed control joints and expansion joints.
 - 1) Provide interior elevation drawings for interior elevations which are not included as part of the Contract Drawing set.
 - c. Indicate designated hourly ratings.
 - 3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Ceiling and Wall Systems (gypsum board products, insulation, acoustical ceiling systems and wall coverings) to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier.

- B. Storage and Handling Requirements:
 - 1. Store materials inside under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
 - a. Neatly stack board materials flat to prevent sagging.
 - 2. Handle board materials so to prevent damage to edges, ends and surfaces.
 - 3. Protect metal trim accessories and corner beads from being bent or damaged.
- C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including plaster materials in packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.7 SITE CONDITIONS

- A. In accordance with GA 216, maintain minimum ambient temperature of 50 degrees Fahrenheit 48 hours before, during taping and compounding, and until completely dry thereafter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Metal components and related items:
 - a. Clarkwestern Dietrich Building Systems, LLC, Schiller Park, IL.
 - b. Marino\Ware, Division of Ware Industries, South Plainfield, NJ.
 - c. Cemco Steel Framing and Metal Lath, City of Industry, CA.
 - d. Telling Industries, Mentor, OH.
 - e. United States Gypsum Company (USG), Chicago, IL.
 - 2. Gypsum liner panels and board materials:
 - a. United States Gypsum Company (USG), Chicago, IL.
 - b. National Gypsum Company, Charlotte, NC.
 - c. Georgia-Pacific Gypsum, LLC, Atlanta, GA.
 - d. Lafarge Corporation, Hendron, VA.
- B. The design and details as shown on the drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 DESCRIPTION

- A. Regulatory Requirements:
 - 1. Fire resistance ratings: Provide materials and assemblies of the rating required, tested per ASTM E 119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design

Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters

2. Seismic Compliance: Nonstructural components that are permanently attached to structures and their support attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance to local jurisdiction.

B. Sustainability Requirements:

1. Gypsum Board Recycled Content: Use maximum available percentage of recycled materials. Gypsum board products incorporated into the work shall contain not less than 50 percent of recycled materials.

2.3 MATERIALS

- A. Studs for shaft wall assemblies: or, 20 gage (0.0329 inch [0.84 mm] minimum thickness), galvanized and complying with ASTM C 645, 2-1/2 inch size, or as indicated otherwise in the drawings.
 1. Framing members shall have a G-40 (hot-dipped galvanized) minimum protective coating conforming to ASTM A653 and ASTM A1003 (table 1). Equivalent coatings (G40e) will not be considered equal.
 2. Acceptable products include the following:
 - a. Clarkwestern Dietrich Building Systems, LLC, West Chester, OH, product, "C-T Stud".
 - b. Marino\Ware, Division of Ware Industries, South Plainfield, NJ, product: "CT-Stud".
 - c. Cemco Steel Framing and Metal Lath, City of Industry, CA, product; "C-H Studs".
 - d. Telling Industries, Mentor, OH, product; "C-T Stud".
 - e. United States Gypsum Company (USG), Chicago, IL product, "C-H Studs".
- B. Runners for studs in shaft wall assemblies: J-track, galvanized and complying with ASTM C 645, with 2-1/4 inch leg, in size, gage and manufacturer to match shaft wall studs.
- C. Struts for jamb framing of door openings in shaft wall assemblies: J-type strut, galvanized and complying with ASTM C 645, 20 gage (0.0329 inch [0.84 mm] minimum thickness), with minimum 3 inch return.
- D. Shaftwall liner: UL fire resistance rated, ASTM C 442 - Type X board with beveled edges, 1 inch thick, 24 inches wide, of lengths to minimize end joints.
 1. Acceptable products include the following, or approved equal:
 - a. United States Gypsum Company (USG) Sheetrock Brand product; "Mold-Tough Liner Panels".
 - b. National Gypsum Company, Gold Bond Brand product; "Fire-Shield Shaftliner XP, with Sporgard".
 - c. Georgia-Pacific Gypsum, LLC, product; "DensGlass Shaftliner".
 - d. Lafarge Corporation, product "Mold Defense Shaftliner Type X".

- E. Gypsum board and finishing: Specified under Section 09 29 00 – GYPSUM BOARD.

2.4 ACCESSORIES

- A. Finishing trim, joint tapes, compound and accessories: Specified under Section 09 29 00 – GYPSUM BOARD.
- B. Fasteners:
 - 1. Shaft wall framing:
 - a. Expansion-type fasteners for securing vertical concrete and masonry surfaces.
 - b. Concrete stub nails for securing runners to concrete.
 - c. N^o.7 by 7/16 inch Pan head self-drilling screw to attach metal framing components.
 - 2. Board fasteners: In compliance with ASTM C954 or ASTM C1002, of head type, thread, point and finish as recommended by the shaft wall system manufacturer.

2.5 SOURCE QUALITY CONTROL

- A. Obtain shaft wall products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of shaft wall system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that all items which are to be enclosed by Work of this Section, have been permanently installed, inspected and approved.
- B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 INSTALLATION - GENERAL

- A. Erect shaft wall systems in strict accordance with the manufacturers' UL listed test construction for the required fire rating and in strict accordance with manufacturer's instructions, ASTM C 754 for Metal Framing, together with the additional requirements specified herein and as indicated on the Drawings.
- B. Install supplementary framing in shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.

3.3 INSTALLATION OF SHAFT WALL

- A. Install J runners or E studs at floor and ceiling structural elements with suitable fasteners located 2 inches from each end and intermediate fasteners spaced no greater than 24 inches.
 - 1. Install runners and studs prior to fireproofing.

2. Do not splice studs, all studs shall extend from the floor to the underside of the structure above in one single length.
- B. Install studs in direct contact with all door and window frame jambs, abutting partitions, partition corners and existing construction elements; screw fasten with one screw per flange.
 1. Where studs are installed directly to exterior masonry walls, install 15 pound asphalt felt between stud and wall.
 - C. Install studs 3/8 inch to not more than 1/2 inch less than opening height and install between liner panels with liner inserted in the groove. Install full-length steel "E" studs over shaft wall liner at T-intersections, corners, columns and both sides of closure panels. Frame openings cut within a liner panel with "E" studs around perimeter. For openings, frame with vertical "E" studs at edges, horizontal J-strut at head and sill, and reinforcing as recommended by the shaft wall manufacturer. Suitably frame all openings to maintain structural support for wall.
 - D. Furnish and install additional cross bracing and other framing elements, as required to assure a completely rigid assembly on metal stud partitions and furred areas, whether or not such bracing has been indicated on the Drawings, and for proper receipt of items which will be attached to partition surfaces.
 1. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices and similar items.
 - E. Cut liner board panels 1 inch less than opening height and erect vertically between J-runners. Where shaft walls exceed 14 feet in height, position liner panel end joints within upper and lower third points of wall. Stagger joints top and bottom in adjacent panels.
 1. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.
 - F. Erect fire rated gypsum panel base layer horizontally on one side of studs with end joints staggered. Fasten base layer to studs with 1 inch, Type S-12 screws. Caulk perimeter of base layer panels.
 - G. Apply fire rated gypsum panels face layer vertically over base layer with joints staggered and attach with 1-5/8 inch Type S-12 screws staggered from those in base, spaced 12 inches on center and driven into studs.
 - H. Finish boards, trim and joint compound finishing as specified under Section 09 29 100 – GYPSUM BOARD.
- 3.4 APPLICATION OF ACOUSTICAL SEALANT
- A. General: Install sealant and backing in accordance with the recommendations of ASTM C-919 and sealant manufacturer's recommendations.
 1. Perform preparation in accordance with C-790. Thoroughly clean all joints, removing all loose mortar, oil, grease, dust, frost, and other foreign materials that will prevent proper adhesion of primers and sealant materials.

2. If so recommended and furnished by the specific sealant manufacturer, apply primer to all joint surfaces, taking care not to stain adjacent surfaces.
 - B. Seal all partition perimeters prior to taping or compounding. Where perimeters are edged with metal trim, apply sealant and backing material between trim and dissimilar material.
 - C. Seal all penetrations in partition types designated for "acoustical" insulation. Penetrations to receive sealant include electrical boxes, plumbing, heating and air conditioning ducts, telephone, intercom hookups and similar items.
 1. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.
 - a. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
 - b. Do not stretch back-up material into joints.
 - c. Install bond breaker wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.
 2. Apply sealant in continuous beads without open joints, voids or air pockets
 - a. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
 3. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.
- 3.5 APPLICATION OF JOINT TREATMENT
- A. Application of joint tape and compound finishing is specified under Section 09 29 00 – GYPSUM BOARD.
- 3.6 TOLERANCES
- A. Install shaft wall partitions with a maximum variation from true flatness of 1/8 inch per 10 feet, noncumulative.
- 3.7 CLEANING
- A. Daily clean work areas by sweeping and disposing of debris, scraps, and deposits of compound and gypsum fill.
 - B. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of gypsum fill, and other materials installed under this Section.

End of Section

Section 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of non-load bearing metal framing for partitions, ceilings, and soffits, where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
 - 1. Coordinate work of this Section with Section 23 00 00 – HVAC for required stud spacing and locations of vertical ductwork within interior walls.
- B. Furnish and install:
 - 1. Metal furring and framing including cross bracing and knee bracing including designing framing for doors, finishes, openings, jambs and headers where indicated on the Drawings.
 - 2. Reinforcing plate blocking.
 - 3. Deflection track assemblies at tops of metal stud partitions.
 - a. Provide fire-rated assemblies at fire-rated, corridor, and smoke partitions.
 - b. Provide non fire-rated assemblies at all other partitions.
 - 4. Metal framing for decorative column covers.
 - 5. Provide special designed framing at the curtain framing support at the stage curtain.
 - 6. “Z” furring stud wall attachment clips at structural steel to receive cementitious fireproofing and other locations as indicated on Drawings.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 05 40 00 – COLD-FORMED METAL FRAMING: Engineered framing systems to receive gypsum drywall finish.
- G. Section 06 10 00 - ROUGH CARPENTRY:
 - 1. Wood blocking.
 - 2. Installation of hollow metal and aluminum door frames in gypsum drywall work.
- H. Section 07 21 00 - THERMAL INSULATION: Thermal and acoustical batt insulation.
- I. Section 07 81 00 – APPLIED FIREPROOFING: Cementitious fireproofing at structural steel.
- J. Section 07 95 13 - EXPANSION JOINT COVER ASSEMBLIES: Prefinished joint assemblies for floors, walls and ceiling/soffit surfaces.
- K. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Furnishing steel door frames.
- L. Section 08 31 00 - ACCESS DOORS AND PANELS: Shop primed access panels, occurring in partitions and walls.
- M. Section 09 29 00 - GYPSUM BOARD: Gypsum board, applied over metal framing installed by this Section 09 22 16 including: gypsum board, and related trim components.
- N. Section 09 51 00 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceiling, including metal suspension system.
- O. Division 21 - FIRE SUPPRESSION: Fire protection systems occurring within non-structural metal framed assemblies.
- P. Division 22 - PLUMBING: Plumbing systems occurring within non-structural metal framed assemblies.
- Q. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Supply and return air registers.
- R. Division 26 - ELECTRICAL: Independent hangers for suspended lighting fixtures.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of

Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ASTM C 525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process..
2. ASTM C 645 - Non-Load Bearing Steel Studs, Runners, and Rigid Furring Channels for Screw Application of Gypsum Board.
3. ASTM C 646 - Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gage Steel Studs.
4. ASTM C 754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wallboard.
5. ASTM E 90 - Method of Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
6. ASTM E 119 - Fire Tests of Building Construction and Materials.
7. GA 203 - Installation of Screw-Type Steel Framing Members to Receive Gypsum board.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work
2. Work of this Section shall be closely coordinated with the work of Section 09 29 00 - GYPSUM BOARD to assure the steady progress of the Contract.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

- e. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer.
- C. Qualifications:
 - 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Protect materials from damage due to moisture, surface contamination, corrosion and damage from construction operations and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The design and details as shown on the drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 DESCRIPTION

- A. Regulatory Requirements
 - 1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.
 - 2. Fire resistance ratings: Where gypsum board systems with fire-resistance ratings are indicated, provide materials and assemblies of the rating required, tested per ASTM E 119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters.
 - a. Fire-Test-Response Characteristics: Provide components that comply with rating requirements specified for fire-rated assemblies under UL 2079 for non-load bearing wall systems.

- 1) Deflection Clips and Firestop Track: Connections and/or top runner provided in fire-resistance-rated assemblies shall be certified by UL 2079 for cyclic movement requirements.

B. Sustainability Requirements:

1. Recycled content of Steel: Use maximum available percentage of recycled steel. Steel framing products incorporated into the work shall contain not less than 30 percent of recycled steel.

2.3 FRAMING MATERIALS

- A. "Hat shaped" Furring channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel conforming to ASTM C 645.
- B. Resilient furring channels: Roll-formed, hat-shaped, 1/2 x 2-5/8 inch, 26 gage hot-dip galvanized steel conforming to ASTM C 645, with pre-punched holes, equal to Dietrich Industries, Inc., Pittsburgh PA, Metal Channel "RC1".
- C. Studs: 'C-shaped' screw studs, hot-dip galvanized steel complying to ASTM C 645, 20 gage (0.0329 inch [0.84 mm] minimum thickness), of widths indicated on the Drawings, or thicker gages as required under the specified standards to meet fire resistance ratings.
- D. Runners for metal studs: 'U-shaped' hemmed, hot-dip galvanized steel track conforming to ASTM C645, of gage and width to match respective stud sizes, or heavier gage per design requirements, having 1-1/4 inch leg at all head, (ceiling) conditions and a 4 inch leg at all sill, (floor) conditions.
- E. Internal reinforcement for various stud conditions, and bracing as required: 10 gage, minimum, galvanized steel.
- F. Furnish cross bracing and knee bracing, as required to assure a completely rigid assembly on metal stud partitions and furred areas.
- G. Comply with minimum gage requirements for various gypsum wallboard types.

2.4 DEFLECTION TRACK ASSEMBLIES:

- A. Non Fire-Rated Assemblies
 1. Deflection Track: Manufacturer's standard top runner with extended flanges designed to prevent cracking of gypsum board applied to interior partitions resulting from deflection of the structure above fabricated from steel sheet complying with ASTM A 653 or ASTM A 568. Thickness as indicated for studs, and width to accommodate depth of studs, and the following configuration.
 - a. Top runner with extended deep flanges that either have V-shaped offsets that compress; slots 1 inch o.c. that allow fasteners attached to studs through the slots; or 16 gage sliding clip assemblies attached to top track and clipped to stud

- B. Fire-Rated Assemblies: Head of wall dynamic fire rated joint systems for head of wall assemblies in compliance with UL 2079 HW-D classified assemblies. Provide one of the following systems:
1. Deflection track / clip system: The Steel Network, Inc., product "VertiClip", including step bushings. Clips and track 20 gage, and of width to accommodate depth of studs indicated.
 2. Deflection slip track System: Comply with requirements of ASTM C 645 except configuration, of thickness indicated for studs and width to accommodate depth of studs indicated with flanges offset to accommodate gypsum board thickness.
 - a. Fire Trak Corp., Kimball, MN products:
 - 1) "Shadowline" at balanced and unbalanced fire-rated assembly partitions.
 - 2) "Cavity Shadowline" at shaftwall and chase wall (double stud) partitions.
 3. Coordination: Verify with partition schedule on the Drawings to ensure proper depth of flange offsets at various partitions types.

2.5 CEILING AND SOFFIT SUSPENSION MATERIALS

- A. Hanger attachments: Galvanized steel hanger eyes, of size and capacity to safely sustain a live load of at least 150 pounds per hanger attachment.
- B. Hangers: Soft temper, pre-stretched galvanized carbon steel wire, conforming with ASTM A641, with a yield stress load of at least three times design load, but not less than 12 gage.
- C. Sound isolation hangers (OT/PT and Vocational Learning Center under Stage as indicated on the Drawings): Pre-compressed neoprene rubber and spring isolation hanger designed for high frequency sound waves and low frequency vibrations. Size hangers as recommended by manufacturer for anticipated ceiling load.
 1. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Kinetics, Noise Control Inc., product, "IsoGrid Ceiling Hanger" as specified herein.
 2. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Kinetics, Noise Control Inc., Dublin, OH.
 - b. L.D. Peters and Sons, Inc., New Rochelle NY.
 - c. Mason Industries, Inc., Happaugue NY.
- D. Sound isolation hangers (Instructor and related Shop Classrooms under Gymnasium; Life Skills and ROTC spaces under Music Rooms and Auditorium): Pre-compressed neoprene rubber and spring isolation hanger; designed for high frequency sound waves and low frequency vibrations. Size hangers as recommended by manufacturer for anticipated ceiling load.
 1. Sound isolation hangers: Kinetics Noise Control, Inc. Dublin, Ohio, "Muta" series, or approved equal.

- E. Grid system for direct attachment of finish board: Comprised of double web main furring tees, 1 1/2 inches high by 1-3/8 inches flange face by 0.020 inch thick; double web cross tees, 1 1/2 inches high by 15/16 inch flange face by 0.020 inch thick; 0.020 inch thick wall channels, with 1-1/2 inches interior web height; and all splices, clips, and related items. Provide Underwriters Laboratories Label fire-rated assemblies for locations requiring fire-rated ceilings and soffits
 - 1. Chicago Metallic product "System 640 and System 650 Furring System".
 - 2. Armstrong Word Industries product "Drywall Furring System".
 - 3. Donn (USG) Corporation, Chicago IL, product "USG Drywall Furring System" with DGLW tees.

2.6 ACCESSORIES

- A. Metal sheet plate blocking and bracing, where indicated: galvanized sheet 0.0312 inch thickness (20 gage).
- B. Fasteners:
 - 1. Expansion-type fasteners for securing vertical concrete and masonry surfaces.
 - 2. Concrete stub nails for securing runners to concrete.
 - 3. N^o.7 by 7/16 inch Pan head self-drilling screw to attach metal framing components.
- C. Reinforcing plates for blocking: 20 gage cold rolled sheet steel, provide minimum 6 inch width, or as otherwise indicated on the drawings.

PART 3 – EXECUTION

3.1 INSTALLATION, QUALITY STANDARDS

- A. General: Perform erection procedures for the various gypsum board system conditions, except as otherwise specified, as set forth in GA 201, GA 206, the written instructions of gypsum board manufacturer, together with the additional requirements specified herein and as indicated on the Drawings.
- B. Wherever fire-resistive rated assemblies are indicated on the Drawings, erect gypsum board systems in strict accordance with the manufacturers' UL listed test constructions for the required fire rating on each specific assembly.

3.2 INSTALLATION OF FURRING

- A. Install metal furring channel horizontally, with channels spaced not more than 16-inch on centers, and attaching the channels to the masonry or concrete substrates with expansion type fasteners spaced not more than 8 inches on centers. Shim beneath channels as needed to ensure that a uniform receiving plane is maintained throughout.

3.3 INSTALLATION OF PARTITION FRAMING, GENERAL

- A. Install metal runners at floor and ceiling to structural elements with suitable fasteners located 2 inches from each end and intermediate fasteners spaced no greater than 24 inches.

- B. Install metal stud framing with open side facing in same direction, engaging floor and ceiling runners.
 - 1. Stud spacing:
 - a. Typical: 16 inches on-center.
 - b. For partitions supporting wall cabinets and other wall mounted equipment: 12 inches on-center.
 - c. For curved partitions space framing closer together than normal to prevent flat areas between framing members.
 - 2. When necessary to splice studs, nest stud with 8 inch overlap and screw studs together with screws on both flanges.
 - 3. Where studs are installed directly to exterior masonry walls, install asphalt felt between stud and wall.
 - C. Install studs in direct contact with all door and window frame jambs, abutting partitions, partition corners and existing construction elements; screw fasten with screw through both flanges of studs and track, top and bottom.
 - D. Securely anchor studs to jamb and head anchors of steel door and window frames. Over head of frames and openings in partitions, install a horizontal section of runner with a web flange bent at each end, horizontally and secure to strut studs with two screws in each bent web. Provide cripple studs over wall openings.
 - E. Where horizontal studs are used for wall reinforcing or framing, cut pieces of stud and install horizontally between vertical studs. Cope horizontal studs to fit between flanges of vertical studs. Bend ends of horizontal studs or install clip angles in order to secure by screwing to vertical studs.
 - F. Furnish and install additional cross bracing and knee bracing and other framing elements, as required to assure a completely rigid assembly on metal stud partitions and furred areas, whether or not such bracing has been indicated on the Drawings, and for proper receipt of items which will be attached to partition surfaces.
- 3.4 INSTALLATION OF DEFLECTION TRACK
- A. Isolate interior metal stud framing and shaft wall framing from building structure to prevent transfer of loading imposed by structural movement due to deflection.
 - 1. Install deflection track top runner in accordance with manufacturer's instructions and as required to attain lateral support and avoid axial loading.
 - 2. Install fire-rated deflection track top runner in accordance with manufacturer's instructions at top of fire-rated, corridor and smoke partitions.
- 3.5 INSTALLATION OF REINFORCING PLATE BLOCKING
- A. Install steel reinforcing plates in partitions and furred walls for the support of wall mounted objects as follows:
 - 1. Wherever such reinforcing plates are indicated on the drawings.
 - 2. In locations where wall bumpers are to be installed for the protection of wall surfaces from swinging doors. (See Section 08 71 00 - DOOR HARDWARE).

- B. Secure gage sheet metal reinforcing plates to steel studs with 1-1/4", Type "S" bugle head screws.

3.6 TOLERANCES

- A. Install partition and ceiling framing and furring with a maximum variation from true flatness of 1/8 inch per 10 feet, noncumulative.

End of Section

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Section 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of gypsum board (drywall) and trim finishes for partitions, ceilings, and soffits, where shown on the Drawings, as specified herein, and as required for a complete and proper installation.
- B. Furnish and install:
 - 1. Taped, compounded and sanded gypsum board finishes.
 - 2. Impact and abuse resistant gypsum board where indicated on Drawings and specified herein.
 - 3. Cementitious tile backer board.
 - 4. Cement board at interior of roof curbs as indicated on Drawings.
 - 5. Stainless steel corner guards.
 - 6. All trim and accessory components related to gypsum board work.
 - 7. Acoustical joint sealant and backing at perimeter of gypsum board partitions.
 - 8. Transition molding at gypsum board where indicated on Drawings
- C. Install access panels occurring in gypsum board work furnished by Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design*

and Construction, LEED BD+C: Schools rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 05 40 00 - COLD-FORMED METAL FRAMING: Load bearing framing.
- G. Section 05 58 13 - COLUMN COVERS: Aluminum and stainless steel column covers.
- H. Section 06 10 00 - ROUGH CARPENTRY:
 - 1. Supplemental wood framing and blocking supporting gypsum board.
 - 2. Installation of metal door frames in gypsum board work.
- I. Section 06 16 00 - SHEATHING: Wall sheathing.
- J. Section 06 20 00 - FINISH CARPENTRY.
- K. Section 07 21 00 - THERMAL INSULATION.
- L. Section 07 84 00 – FIRESTOPPING: Fireproof firestopping, firesafing materials, smoke seals and related accessories, occurring in gypsum wall assemblies, including firestopping for rated walls at flutes in roof deck.
- M. Section 07 95 13 - EXPANSION JOINT COVER ASSEMBLIES: Prefinished joint assemblies for floors, walls and ceiling/soffit surfaces.
- N. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Furnishing steel door frames.
- O. Section 08 31 00 - ACCESS DOORS AND PANELS: Shop primed access panels, occurring in partitions and walls.
- P. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-load bearing partition and ceiling framing and furring.
- Q. Section 09 30 13 – CERAMIC TILING: Ceramic tile finishes over backer board substrate installed by this Section 09 29 00.
- R. Section 09 30 19 – PORCELAIN TILING: Porcelain tile finishes over backer board substrate installed by this Section 09 29 00.
- S. Section 09 51 00 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceilings and transitions.
- T. Section 09 81 00 – ACOUSTICAL INSULATION: Acoustical batt insulation.
- U. Section 09 91 00 - PAINTING: Applied finish coatings.
- V. Section 10 40 00 - SAFETY SPECIALTIES.
- W. Division 21 - FIRE SUPPRESSION: Sprinkler heads in ceiling system.
- X. Division 22 - PLUMBING: Plumbing penetrations in ceiling system.

- Y. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Supply and return air registers.
- Z. Division 26 - ELECTRICAL: Independent hangers for suspended lighting fixtures.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 1. ANSI A108.11 - Interior Installation of Cementitious Backer Units.
 2. ANSI A118.9 - Cementitious Backer Units.
 3. ASTM A 167 - Stainless and Heat-resisting Chromium-nickel Steel Plate, Sheet and Strip.
 4. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
 5. ASTM C 475 - Joint Treatment Materials for Gypsum Wallboard Construction.
 6. ASTM C 630 - Water Resistant Gypsum Backing Board.
 7. ASTM C 754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board.
 8. ASTM C 919 - Use of Sealants in Acoustical Applications.
 9. ASTM C 1002 - Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 10. ASTM C 1047 - Accessories for Gypsum wall board and veneer base.
 11. ASTM C 1396 - Gypsum Wallboard.
 12. ASTM E 90 - Method of Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
 13. ASTM E 119 - Fire Tests of Building Construction and Materials.
 14. GA 201 - Gypsum Board for Walls and Ceilings.
 15. GA 214 - Recommended Specifications for Levels of Gypsum Board Finish.
 16. GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
 17. GA 220 - Recommended Specifications for Gypsum Board Winter Related Job Problems.
 18. UL - Fire Resistance Directory.
 19. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
 20. All applicable federal, state and municipal codes, laws and regulations for fire rated assemblies.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of

installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

2. Work of this Section shall be closely coordinated with the work of Section 05 40 00 - COLD-FORMED METAL FRAMING and Section 09 22 16 - NON-STRUCTURAL METAL FRAMING, to assure the steady progress of the Contract.

B. Sequencing:

1. Do not install gypsum board until all pipes, ducts, conduits, and other such items which are to be enclosed thereby, have been permanently installed, inspected and approved.

1.5 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Shop Drawings:
 - a. Details of any special conditions associated with fireproofing.
 - b. Mark-up a set of blackline interior elevations indicate corrections to grid layout and provide dimensioning showing locations of all proposed control joints and expansion joints.
 - 1) Provide interior elevation drawings for interior elevations which are not included as part of the Contract Drawing set.
3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Ceiling and Wall Systems (gypsum board products, insulation, acoustical ceiling systems and wall coverings) to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

- g. Include submittal documentation requirements for MR Credit 4 Building Product Disclosure and Optimization – Material Ingredients for HPDs.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum board.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. Storage and Handling Requirements:
 - 1. Store materials inside, under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
 - a. Neatly stack board materials flat to prevent sagging.
 - 2. Handle board materials so to prevent damage to edges, ends and surfaces.
 - 3. Protect trim, accessories and corner beads from being bent or damaged.

1.8 SITE CONDITIONS

- A. Environmental Conditions: In accordance with GA 216, maintain minimum ambient temperature of 50 degrees Fahrenheit 48 hours before, during taping and compounding, and until completely dry thereafter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Gypsum board products:
 - a. United States Gypsum Company, Chicago IL. (USG).
 - b. National Gypsum Company, Gold Bond Products Division, Charlotte NC. (Gold Bond).
 - c. G-P Gypsum Corporation, Atlanta GA.
 - d. Continental Building Products, Hendron VA.
 - 2. Cementitious tile backer board ("Cement board"):
 - a. Custom Building Products, Inc., Seal Beach, CA.

- b. Fin Pan, Inc., Hamilton OH.
 - c. Unifix, Inc., division of National Gypsum Company, Charlotte, NC.
 - d. United States Gypsum Company, Chicago, IL.
3. Reveal trim:
- a. Fry Reglet Corporation, Norcross GA
 - b. Gordon Inc., Shreveport LA.
 - c. Pittcon Industries, Inc., Riverdale MD.
- B. The design and details as shown on the Drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 DESCRIPTION

- A. Regulatory Requirements:
- 1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.
 - 2. Fire resistance ratings: Where gypsum board systems with fire-resistance ratings are indicated, provide materials and assemblies of the rating required, tested per ASTM E 119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters.
- B. Sustainability Requirements:
- 1. Gypsum Board Recycled Content: Use maximum available percentage of recycled materials but not less than that required to meet LEED. Gypsum board products incorporated into the work shall contain not less than 50 percent of recycled materials.

2.3 BOARD MATERIALS

- A. Fire rated gypsum board: UL fire resistance rated, ASTM C 1396 'Type X' board, 5/8 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges.
- 1. Acceptable products include the following, or approved equal:
 - a. USG Sheetrock brand "EcoSmart Type ULIX"
 - b. National Gypsum Company, Gold Bond brand product "Fireshield Gypsum Board".
 - c. G-P Gypsum Corporation product, "Toughrock Fireguard".
 - 2. Locations: Typical non-impact/abuse resistant walls and ceilings, above ceiling partitions and first layer of multi-layer assemblies.
- B. Abuse-Resistant Gypsum Board (ARGB): UL type FRX fire resistance type, ASTM C-1278 board, complying with ASTM C1658 and ASTM C36.
- 1. ASTM C1629 Test Result Characteristics, minimum Level ratings:
 - a. Abrasion: Level 2.
 - b. Indention: Level 1.

- c. Soft Body Impact: Level 2.
 - d. Hard Body Impact: Level 1.
 2. Acceptable products include the following or approved equal:
 - a. USG Sheetrock brand product "Moldtough AR", or "Fiberock AR panels".
 - b. National Gypsum Company, Gold Bond brand product "Hi Abuse XP".
 - c. G-P Gypsum Corporation product, "Dense Armor Plus Abuse".
 - d. Continental Building Products, product "Protecta AR 100 Type X with Mold Defense".
 3. Locations: Lobbies, Entrances, Vestibules, Therapeutic Planning, OT/PT, Cafeteria, Corridors, Locker/Team Rooms, Common Rooms, Receiving and Stairs to receive tile or paint finish.
- C. Impact-Resistant Gypsum Board (IRGB): Moisture resistant, UL type FRX fire resistance type, ASTM C-1278 board, complying with ASTM C1658 and ASTM C36.
 1. ASTM C1629 Test Result Characteristics, minimum Level ratings:
 - a. Abrasion: Level 3.
 - b. Indention: Level 1.
 - c. Soft Body Impact: Level 3.
 - d. Hard Body Impact: Level 2.
 2. Acceptable products include the following or approved equal:
 - a. USG Sheetrock brand product "Mold-Tough VHI".
 - b. National Gypsum Company, Gold Bond brand product "Hi Impact XP".
 - c. G-P Gypsum Corporation product, "Dense Armor Plus Impact".
 - d. Continental Building Products, product "Protecta HIR 300 Type X with Mold Defense".
 3. Locations: Kitchen, Culinary Arts, Recycle/Trash, Gymnasium, Weight Room, Stage, Supply/Storage Rooms and other areas to receive FRP panels.
- D. Cementitious backer board (tiled walls): 5/8-inch nominal thickness, glass fiber reinforced, with a minimum compressive strength of 1,250 pounds per square inch and minimum flexural strength of 750 pounds per square inch and manufacturer's standard edge guard system.
 1. Acceptable products include the following, or approved equal:
 - a. United States Gypsum Company, product: "Fiberock".
 2. Locations: Non-rated walls and ceilings at Kitchen Serving, Showers, Locker Rooms (wet areas) and Toilet Rooms scheduled to receive a tile finish.
- E. Cementitious backer board (at roof curbs and masonry veneer): 5/8-inch nominal thickness manufactured for exterior application, glass fiber reinforced.
 1. Acceptable products include the following:
 - a. W.R. Bonseal Inc., product: "Util-a-Crete".
 - b. Unifix, Inc., division of National Gypsum Company, Charlotte, NC., product "PermaBase".
 - c. United States Gypsum Company, product: "Durock with Edgeguard".

2.4 ACCESSORIES

- A. Polyvinyl chloride (PVC) trim accessories, conforming to ASTM D 1784 and C 1047.
1. J Bead: Edge trim with exposed 1/2 inch face cap, furnish trim model number corresponding to the board thickness where installed.
 - a. Plastic Components model number: 200X-50 (for 1/2 inch thick board) or 200S-58 (for 5/8 inch thick board).
 - b. Vinyl Corp. model number: JB50 (for 1/2 inch thick board) or JB58 (for 5/8 inch thick board).
 - c. AMICO. model number: AMJB50 (for 1/2" thick board) or AMJB58 (for 5/8" thick board).
 2. L Bead: casing edge trim, furnish trim model number corresponding to the board thickness where installed
 - a. Plastic Components model number: 221-50 (for 1/2 inch thick board) or 221-58 (for 5/8 inch thick board).
 - b. Vinyl Corp. model number: SB50 (for 1/2 inch thick board) or SB58 (for 5/8 inch thick board).
 - c. AMICO. model number: AMSB50 (for 1/2 inch thick board) or AMSB58 (for 5/8 inch thick board).
 3. L-Bead with removable leg: Casing edge trim for joints at ceilings doors and windows, with removable leg strip, furnish trim model number corresponding to the board thickness where installed
 - a. Plastic Components model number: 224-50 (for 1/2 inch thick board) or 224-58 (for 5/8 inch thick board).
 - b. Vinyl Corp. model number: CT-50(for 1/2 inch thick board) or CT-58 (for 5/8 inch thick board).
 - c. AMICO product "Zip Strip" model number: AMZIP50 (for 1/2 inch thick board) or AMZIP58 (for 5/8 inch thick board).
 4. Corner beads, 90 degree with 1-1/4 inch flanges:
 - a. Plastic Components model number: 209.
 - b. Vinyl Corp. model number: CB125.
 - c. AMICO. model number: AMCB125.
 5. Control joints: "V" type joint with nominal 3/16 inch reveal and removable temporary tape:
 - a. Gold bond model "EZ Strip Expansion Joint".
 - b. Plastic Components model number: 2027-16.
 - c. Vinyl Corp. model number: CJV16.
 - d. AMICO. model number: AMDCJV16.
- B. Paper faced trim accessories for use with Abuse Resistant Gypsum Board:
1. Corner beads (at outside corners): Paper-faced galvanized steel sheet for finishing with joint compound conforming with ASTM C-1047, equal USG product "Sheetrock" Brand Paper-Faced Metal Corner Bead.

- a. Provide curved-edge cornerbead with notched or flexible flanges at curved openings.
 2. Casing beads: Paper-faced galvanized steel sheet for finishing with joint compound conforming with ASTM C-1047, equal to USG product "Sheetrock" Brand Paper-Faced Metal Beads and Trims.
 - a. LC-Bead (J-Bead): Use at exposed panel edges.
 - b. L-Bead: Use where indicated
 - c. U-Bead: Use where indicated.
 3. Control joints: Solid zinc "V-shaped control joint, having 3/32 inch thick perforated grounds, equal to USG Control Joint No. 093.
- C. Reveal trim: Extruded aluminum with manufacturer's standard primed finish with punched tapered fins.
1. "F" reveal: 3/4 inch wide recess by nominally 5/8 inch deep reveal channel equal to Fry Reglet Corporation, model number FDM-625-75.
 2. "J" molding: 1-1/16 wide inch leg by nominally 5/8 inch deep reveal base equal to Fry Reglet Corporation, model number: JDM-625.
 3. "L" molding: 1-1/2 inch deep by 7/8 inch high inch leg equal to Fry Reglet Corporation, model number: DRML-150.
 4. "T" molding: 3/4 inch wide recess by nominally 5/8 inch deep reveal channel with punched tapered fins equal to Fry Reglet Corporation, T-Molding, model number TDM-625-75.
 5. Reveal moulding: 3/4 inch wide recess by nominally 5/8 inch deep reveal channel equal to Fry Reglet Corporation, model number DRM-625-75.
 6. Drywall acoustical reveal: 3/4 inch wide recess by nominally 1/2 inch deep reveal channel equal to Fry Reglet Corporation, model number DRMAD-50-75.
 7. Exterior finish system soffit vent: 4 inches wide equal to Fry Reglet Corporation, model number DRM-50-V-400.
 8. V control joint: Equal to Clark Dietrich Building Systems #093 Zinc Control Joint.
- D. Transition trim: 15/16 inch horizontal flanged, cold rolled steel chemically cleaned in manufacturer's standard white finish equal to Armstrong World Industries "15/16" Flush Transition Molding".
1. 'F' reveal: 3/4 inch wide recess by nominally 5/8 inch deep reveal channel equal to Fry Reglet Corporation, model number FDM-625-75.
 2. Refer to Section 09 51 00 – ACOUSTICAL CEILINGS for transition trim between ceiling and soffit,
- E. Partition closures: Adjustable partition closure at transition between windows and partition walls, in sizes as indicated on the Drawings, as manufactured by Gordon Incorporated, Bossier City, LA., product: "Mullion Mate", or approved equal.
1. Finish to match Architect's sample.
- F. Flat wall end cap: Partition termination cap at end of partition walls, 3-3/4 inches in width, unless otherwise indicated on the Drawings, as manufactured by Gordon Incorporated, Bossier City, LA., product: "911-EC-375", or approved equal.

- G. Tapes and compound:
1. Primer/surfacer (at ARGB only): High build spray applied primer/surfacer USG, product "Tuff-Hide" or approved equal. Primer/surfacer shall be provided by the same manufacturer as the abuse resistant gypsum board.
 2. Joint tape (at paper-faced gypsum): Nominal 2 inch wide, high strength, cross-fibered paper drywall tape.
 3. Joint tape (at fiberglass faced gypsum): Nominal 2 inch wide, self-adhering (adhesive backed), fiberglass mesh tape.
 4. Joint compound for setting fiberglass joint tape:
 - a. Acceptable products include the following or approved equal
 - 1) Certainteed, Valley Forge PA, product "ProRock Moisture and Mold Resistant 90".
 - 2) Georgia Pacific Gypsum LCC, Pittsburgh PA, product "Densarmor Cote"
 - 3) CTS Cement Manufacturing Corporation, Cypress CA., product "Rapid Set OnePass".
 - 4) United States Gypsum Company, Chicago IL, product "Durabond"
 5. Joint compound for setting paper joint tape: 'Speed-setting type compound', field mixed.
 - a. Acceptable products include the following or approved equal:
 - 1) USG product "Durabond" or "Easysand".
 - 2) Gold bond product "Stay Smooth 30".
 - 3) Georgia Pacific Gypsum LCC, product "ToughRock All-Purpose Dry Mix"
 6. Joint Compound for finishing: Field mixed joint compound or factory pre-mixed compound.
 - a. Field-mixed compounds:
 - 1) Acceptable products include the following or approved equal:
 - a) USG product "Durabond 90".
 - b) Gold bond product "Stay Smooth 90".
 - c) Georgia Pacific Gypsum LCC, product "ToughRock Setting Compound 90".
 - b. Factory pre-mixed compounds:
 - 1) Acceptable products include the following or approved equal:
 - a) USG product "Ready-Mixed Joint Compound".
 - b) Gold bond product "All Purpose Compound".
 - c) Georgia Pacific Gypsum LCC, product "ToughRock Ready Mix All-Purpose Compound"
- H. Fasteners (interior board systems):
1. Type S, bugle head screws complying with ASTM C 1002, for applying gypsum board to metal framing, ceiling grid system, and furring channels.
 - a. Not less than 1 inch long for single layer gypsum board.
 - b. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board.

2. Type W, bugle head screws complying with ASTM C 1002, for applying gypsum board to wood plywood backing, and blocking
 - a. Not less than 1-1/4 inch [31mm] long for single layer gypsum board
 - b. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board,
3. Type S-12, fine thread self-drilling screws complying with ASTM C 1002, for applying gypsum board to light gage metal framing.
 - a. Not less than 1 inch [25 mm] long for 1/2 inch thick single layer gypsum board.
 - b. Not less than 1-1/4 inch [31mm] long for 5/8 inch thick single layer gypsum board.
 - c. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board,
- I. Ceiling buttons, perforated type, 1 inch diameter, for use at multiple layered gypsum board ceiling systems.
- J. Laminating adhesive: USG Durabond Joint Compound 90, USG Ready-mixed All Purpose Compound, or equal.
- K. Joint Sealers (interior acoustical sealant type): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable. Acceptable products include the following, or approved equal.
 1. Tremco, Beachwood OH.; product, "Acoustical Sealant".
 2. United States Gypsum Company, Chicago IL.; product "USG Acoustical Sealant".
 3. Pecora Corporation, Harleysville PA.; product "AC-20 FTR".
- L. Liquid sealer for cuts, holes and ends of moisture resistant board; provide one of the following or acceptable equal.
 1. Shellac type sealer: mix 4 pounds of orange or bleached shellac dissolved in 1 gallon of denatured ethyl-alcohol.
 2. Varnish type sealer: Fast setting marine varnish.
- M. Spot grout: Provide grout complying with ASTM C 475 for setting type joint compound recommended for spot grouting hollow metal door frames.

2.5 SOURCE QUALITY CONTROL

- A. Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that all items which are to be enclosed by Work of this Section, have been permanently installed, inspected and approved.
- B. Inspect framing and other substrates; verify that they are in proper condition to receive the work of this Section.

- C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. During the operation of gypsum board work, protect all wood, metal, glass, flooring, and other finished materials against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

3.3 INSTALLATION - GENERAL

- A. General: Perform erection procedures for the various gypsum board system conditions, except as otherwise specified, as set forth in GA 201, GA 216, GA 220, the written instructions of gypsum board manufacturer, together with the additional requirements specified herein and as indicated on the Drawings.
- B. Where fire-resistive rated assemblies are indicated, erect gypsum board systems in strict accordance with the manufacturers' UL listed test constructions for the required fire rating on each specific assembly.
- C. Install specified control joints where indicated on Drawings and where run of partitions, or furred surfaces exceeds 30 feet. Show locations of all control joints on shop drawings.
 - 1. Locate control joints at corners of head frames of doors.
 - 2. Run vertical control joints continuously to top of partition, shaft wall or furred area, as applicable.

3.4 INSTALLATION OF GYPSUM BOARD

- A. Screw fasten only, gypsum board to framing and furring, with ends and edges occurring over firm bearing. At all door jambs screw fasten gypsum panels 8 inches on center to both box studs
 - 1. Erect single layer fire-resistance rated gypsum board vertically.
 - 2. Erect standard and moisture resistant layer board in most economical direction.
 - 3. Erect ceiling and soffit gypsum boards to meet UL requirements, where applicable, stagger end joints over supports. Secure gypsum board with fasteners inserted through ceiling buttons; anchor fasteners directly to framing or suspended support system.
- B. Wherever items penetrate the gypsum board surfaces, use extra care in cutting the gypsum board to ensure a uniformly-dimensioned joint between the penetrating item and the gypsum board, and fill joints with specified sealant material. Verify the expected deflection factor of the penetrating members, and cut the gypsum accordingly, to prevent damage thereto from the deflecting members.
- C. Treat cut edges and holes in moisture resistant gypsum board with approved liquid sealer.
 - 1. If shellac is used, apply in thin layers to dry quickly.

- D. Spot grout all hollow metal door frames. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames at all door locations.

3.5 INSTALLATION OF CEMENT BOARD

- A. Walls:
 - 1. Wall framing substrate: Do not install cement board directly over protrusions from stud plane such as heavy brackets or fastener heads.
 - 2. Make necessary cut-outs. Install cement board horizontally leaving 1/8 to 3/16 space at all joints, including joints with dissimilar materials. Stagger board joints with those of adjacent rows.
 - 3. Fasten cement board with 1-1/4 inch length type S bugle head screw. Fasten boards every 8 inches on center in field and along edges. At edge conditions, locate fasteners between 1/2 inch to 2 inches from board edge.
 - 4. At all joints and corners, fill gap solidly with dry-set or latex-modified, portland cement mortar and imbed 2 inch mesh fiberglass table and smooth material over joint and corner.

3.6 INSTALLATION OF REVEAL TRIM

- A. General: Install reveal trim in accordance with trim manufacturer's recommendations and as follows:
 - 1. Lay out drywall surface with chalk lines to exact heights and locations indicated. Cut out gypsum board with router.
 - 2. Cut extrusions to proper lengths and dry-fit to drywall. Mitre all corners for hairline joints.
 - 3. Screw install trim through at 8 inches on center maximum with standard bugle head drywall screws.

3.7 APPLICATION OF ACOUSTICAL SEALANT

- A. General: Install sealant and backing in accordance with the recommendations of ASTM C-919 and sealant manufacturer's recommendations.
 - 1. Perform preparation in accordance with C-790. Thoroughly clean all joints, removing all loose mortar, oil, grease, dust, frost, and other foreign materials that will prevent proper adhesion of primers and sealant materials.
 - 2. If so recommended and furnished by the specific sealant manufacturer, apply primer to all joint surfaces, taking care not to stain adjacent surfaces.
- B. Seal all partition perimeters prior to taping or compounding. Where perimeters are edged with metal trim, apply sealant and backing material between trim and dissimilar material.
- C. Seal all penetrations in partition types designated for "acoustical" insulation. Penetrations to receive sealant include electrical boxes, plumbing, heating and air conditioning ducts, telephone, intercom hookups and similar items.
 - 1. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.

- a. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
 - b. Do not stretch back-up material into joints.
 - c. Install bond breaker wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.
2. Apply sealant in continuous beads without open joints, voids or air pockets
 - a. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
 3. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

3.8 APPLICATION OF JOINT TREATMENT

- A. Install joint tape at all joints where gypsum boards abut and where boards form internal corners, whether or not such joints will be concealed from view.
- B. Apply compound to all joints, edges, corners, fastener head depressions and abrasions in the surfaces, whether or not such conditions will be concealed from view. Sand completely smooth all compound surfaces, which will be exposed to view, and leave ready to receive applied coatings or finish.
- C. Provide the minimum levels of gypsum board finishes as defined by the Gypsum Association recommended specifications GA-214 and GA-216, per the following:
 1. At areas hidden from view, except as otherwise specified: Level 1.
 2. At areas hidden from view, requiring a fire rating: Level 1.
 3. At concealed plenum spaces above ceilings attic spaces: Level 1.
 4. At non-occupied spaces (i.e. attics): Level 1.
 5. At surfaces scheduled to receive tile: Level 2.
 6. At surfaces scheduled to receive applied acoustical wall paneling: Level 2.
 7. At surfaces scheduled to receive "flat" (without any sheen), "pearlescent", and egg-shell low-gloss painted finishes: Level 4.
 8. Spray apply primer at all ARGB in accordance with manufacturer's instructions to produce a Level 5 finish.

3.9 TOLERANCES

- A. Maximum variation for gypsum board partitions and ceilings from true flatness: 1/8 inch per 10 feet, noncumulative.

3.10 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris, scraps, and deposits of compound and gypsum fill.

- B. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of gypsum fill, and other materials installed under this Section.

End of Section

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Section 09 30 13
CERAMIC TILING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 03)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Sub Bid Requirements: As provided under Section 09 00 03 - TILE TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 03.

1.2 SUMMARY

- A. The work of this Section consists of tiling where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following:
- B. Furnish and install the following:
1. Ceramic wall tile.
 2. Installation systems, adhesives, mortars and grouts.
 3. Fluid applied waterproofing membrane at wet floor areas and where additionally indicated.
 4. Anti-fracture membrane at slab on grade conditions and "dry" flooring areas.
 5. Preparation of control joints to receive sealant in tiled work.
 6. Metal edge and transition strips.
- C. Install the following furnished under the designated Sections:
1. Install access panels into tiled walls as specified under Section 08 31 00 - ACCESS DOORS AND PANELS.
- D. Perform drilling and cutting in tile surfaces, as required to accommodate penetrating items of other trades, from templates and instructions furnished by the respective trades.
- E. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 04 20 00 - UNIT MASONRY: Concrete masonry unit substrate.
- F. Section 07 92 00 - JOINT SEALANTS: Backer rod and sealant at control joints.
- G. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: access panels, occurring in partitions and walls.
- H. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Metal stud framing to receive cementitious backer board installed under this Section.
- I. Section 09 29 00 – GYPSUM BOARD: Backer panels to receive tile finish.
- J. Section 09 00 03 – TILE TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- K. Section 09 30 19 - PORCELAIN TILING: Porcelain tile with setting systems, as part of this Trade Contract.
- L. Section 10 28 13 - TOILET ACCESSORIES: Furnishing toilet accessories and installation templates.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A108.1A - Installation of Ceramic Tile in the Wet Set Method, with Portland Cement Mortar.
 - 2. ANSI A108.1B - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
 - 3. ANSI A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
 - 4. ANSI A108.10 - Installation of Grout in Tilework.
 - 5. ANSI A118.1 - Dry-Set Portland Cement Mortar.
 - 6. ANSI A118.4 - Latex-Portland Cement Mortar.
 - 7. ANSI A118.6 - Ceramic Tile Grouts.

8. ANSI A118.7 – Polymer Modified Cement Grouts
 9. ANSI A118.10 - Waterproofing.
 10. ANSI A137.1 - Specifications for Ceramic Tile.
 11. ANSI A10.20 - Safety Requirements for Ceramic Tile, Terrazzo and Marble Work.
 12. TCNA (formerly TCA) - Handbook for Ceramic Tile Installation, latest edition.
 13. ASTM C 144 - Aggregate for Masonry Mortar.
 14. ASTM C 150 - Portland Cement.
 15. ASTM A 185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 16. ASTM C 627 - Evaluating Ceramic Floor Tile Installation Systems.
 17. ASTM C 920 - Specifications for Elastomeric Joint Sealant.
 18. ASTM C 1026 - Measuring Resistance of Ceramic Tile to Freeze Thaw Cycles
 19. ASTM C 1027 - Determining Visible Abrasion Resistance of Glazed Ceramic Tile
 20. ASTM D 226 - Asphalt Saturate Felt used in Roofing and Waterproofing.
 21. ASTM D 2103 – Polyethylene Film
 22. ASTM E 119 – Fire Test of Building Construction and Materials.
- B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:
1. TCNA (formerly TCA) - Handbook for Ceramic Tile Installation, latest edition.
- C. Definitions: For the purposes of these specifications the following terms are defined:
1. Wet Areas: Rooms/spaces which has plumbing fixtures, sinks, toilets, or floor drains. Wet areas additionally include rooms/spaces which are exposed to weather.
 2. Dry Areas: Rooms/spaces which have no plumbing, sinks, toilets, or floor drains.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Include maintenance data and recommended cleaning materials, and cleaning and stain removal methods.
 2. Shop Drawings: 1/4 inch scale elevations and plans of tile patterns.
 3. Selection Samples:
 - a. Manufacturer's sample boards for each type and color group of tile specified, and grout colors, for selections by the Architect.
 4. Verification Samples:

- a. Mount tile and apply grout on one 12 by 12 inch cement backerboard, for each tile type and selected color, to indicate color and texture variations, tile flatness and joint size variations.
 - b. Trim shapes and base, in selected colors in types and shapes indicated for project conditions.
 - c. Stone threshold, 12 inch long samples in shaped profile.
 5. Source Quality Control Submittals:
 - a. Grade Certificates: Manufacturer's Master Grade Certificates submitted prior to shipment of tile to project.
 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
 - g. Include submittal documentation requirements for MR Credit 4 Building Product Disclosure and Optimization – Material Ingredients for HPDs.
 - B. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra materials in, an amount equal to 3 percent of tile and trim of each color, finish and type installed.
- 1.6 QUALITY ASSURANCE
- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. Conform to ANSI/TCNA A 137.1 and TCNA Handbook for Ceramic Tile Installation.
 - B. Sole Source: Obtain installation products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum board.
 - C. Qualifications:
 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.
- 1.7 MOCK-UPS
- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
 - B. Provide mock-up panels, minimum 25 square feet, illustrating color, texture and finish, and demonstrating the minimum standard for the Work.
 1. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
 2. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.
- 1.8 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 2. Deliver tile in manufacturer's sealed cartons, grade-sealed by the manufacturer in accordance with ANSI A 137.1, with grade-sealed unbroken, and clearly marked as to contents, color, and quantity.
 3. Deliver and store tile setting materials in original, sealed, containers showing manufacturer's identification, year of production, new weight, date of packaging, and location of packaging.
 - B. Storage and Handling Requirements:
 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 2. Store and protect containers above floor level, keep dry until ready for use.
 3. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.
- 1.9 SITE CONDITIONS
- A. Environmental conditions:
 1. General: Maintain ambient temperatures between 50 (10° C) and 80 (26° C) degrees Fahrenheit in tiled areas, for 24 hours prior to installation, during installation and for 7 days after completion.
 2. When temperature of substrate exceeds 90 (32° C) degrees Fahrenheit, contact manufacturer for instructions.

- B. Do not install setting or grouting materials in a closed, unventilated environment. Ventilate propane or fossil fuel heaters to prevent damage to tile work from carbon-dioxide build up.

1.10 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty: The manufacturer of installation systems, adhesives, grouts and mortars shall provide a comprehensive non pro-rated written five (5) year warranty against defective products which covers replacement materials and labor costs for demolition, tile accessories, and installation systems.
 - 1. Warranty to provide for tile lifting or separation from substrate, and setting bed/grout deterioration, when products have been installed with referenced TCNA setting systems using specified setting and grout materials.
 - 2. Warranty excludes structural failure, movement or cracking of substrate materials, and workmanship performed not in accordance with manufacturer's instructions and industry standard guidelines.
- C. Special Warranty: Provide 2 year, non pro-rated warranty which shall include provisions for cracking, breakage or failure of tile due to defective workmanship
 - 1. Materials must be compatible and from one source, single source responsibility for waterproofing, installation, mortars and grouts. Job-site mixtures of sand portland cement and site dilution of additives shall not be permitted.

1.11 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, deliver to the Owner extra materials for future repairs and maintenance.
 - 1. Furnish 3 percent of each size, color, and surface finish of tile specified, but not less than 25 square feet of each type.
 - 2. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Glazed ceramic wall tile:
 - a. American Olean Tile Company, Lansdale, PA.
 - b. Dal-Tile Corporation, Dallas, TX.
 - c. Sikes Corp., Florida Tile Division, Lakland, FL.
 - 2. Mortars, adhesives & Grouts:
 - a. Bostik Corp. (Hydroment), Middleton MA.
 - b. C-Cure Chemical Company, Inc., Houston, TX

- c. Custom Building Products, Inc., Seal Beach, CA.
 - d. Laticrete International, Inc., Bethany, CT
 - e. Mapei Corporation, Elk Grove, IL.
 - f. TEK Special Construction Brands, Inc. (division of HB Fuller), Arlington Heights, IL.
3. Edging materials:
- a. Schlüter Systems L.P., Plattsburgh NY.
 - b. Ceramic Tool Company Inc., Waukesha WI.
 - c. Custom Building Products, Inc., Seal Beach, CA.

2.2 TILE

- A. Glazed ceramic wall tile (CT-1): Standard grade glazed ceramic tile, conforming to ANSI A137.1, nominal 6 by 18 by 5/16 inch thick, ceramic body, square-edges as manufactured by Dal-Tile Corporation or approved equal in colors selected from the full range of Group I and II "Matte" finish wall tile including Dal-Tile, "Color Wheel Linear Collection" series in combinations and patterns as indicated on Drawings.
1. Up to three (3) colors in Color Group II.
 2. Locations: Field glazed ceramic tile at porcelain tile and Toilet/Locker/Shower.
 3. Trim and special shapes: Provide all bases, stops, returns, trimmers, and other shapes indicated or required to produce a completely finished installation.
 - a. Except as may be otherwise indicated, provide color and finish matching adjacent tile.
- B. Glazed ceramic wall tile (CT-2): Standard grade glazed ceramic tile, conforming to ANSI A137.1, nominal 3 by 6 by 5/16 inch thick, ceramic body, square-edges as manufactured by Dal-Tile Corporation or approved equal in colors selected from the full range of "Matte" finish wall tile including Dal-Tile, "Festiva" series in combinations and patterns as indicated on Drawings.
1. Minimum of five (5) colors in from same price group.
 2. Locations: Accent glazed ceramic tile at porcelain tile.
 3. Trim and special shapes: Provide all bases, stops, returns, trimmers, and other shapes indicated or required to produce a completely finished installation.
 - a. Except as may be otherwise indicated, provide color and finish matching adjacent tile.
- C. Glazed ceramic wall tile (CT-3): Standard grade glazed ceramic tile, conforming to ANSI A137.1, nominal 6 by 18 by 5/16 inch thick, ceramic body, square-edges as manufactured by Dal-Tile Corporation or approved equal in colors selected from the full range of "Matte" finish wall tile including Dal-Tile, "Colormatch Program" series in combinations and patterns as indicated on Drawings.
1. Minimum of five (5) colors in from same price group.
 2. Locations: Accent glazed ceramic tile at porcelain tile and Toilet/Locker/Shower.

3. Trim and special shapes: Provide all bases, stops, returns, trimmers, and other shapes indicated or required to produce a completely finished installation.
 - a. Except as may be otherwise indicated, provide color and finish matching adjacent tile.
- D. Glass tile (CT-4): Glass tile conforming to ANSI A137.2, nominal 3 by 6 by 5/16 inch thick, square-edges as manufactured by Dal-Tile Corporation or approved equal in colors selected from the full range of glass tile including Dal-Tile, "Color Wave" series in combinations and patterns as indicated on Drawings.

2.3 SETTING MATERIALS

- A. Thin-set polymer-modified Portland cement dry-set mortar, complying with the bond strength requirements of ANSI A118.4.
 1. Manufacturer: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Mapei product: "Kerabond" with "Keralastic" additive.
 - b. Laticrete product number 254 Platinum, with antimicrobial additive.
 - c. Custom Building Products "Porcelain Tile Mortar"
- B. Fluid applied waterproofing membrane: ASTM C627 classification "Extra Heavy". Two component liquid rubber membrane cold applied, load bearing, bonded, non-toxic, non-flammable, and non-hazardous, used with 20 mil (0.5mm) thick flexible nonwoven rot-proof polyvinyl chloride reinforcing fabric.
 1. Waterproofing membrane shall be IAPMO certified as shower pan liner under the International Plumbing Code.
 2. Waterproofing membrane shall provide crack suppression and isolation for anti-fracture per ANSI A118.12.5.4, spanning 1/8 inch (3mm) crack, and meet the following physical requirements:
 - a. Water Permeability (at 30ft.hydro/0.9 atmos/91.2kPa): Nil.
 - b. Elongation at break (ASTM D-751): 20 to 30%
 - c. Service Temperatures: -20° to +280°F. (-29°to +138°C).
 - d. Tensile breaking strength: 2950psi (20.4MPa;207kg/cm²)
 - e. Bond strength to concrete: 350psi (2.4MPa;24kg/cm²)
 - f. Resistance to chemicals (90 day immersion):
 - 1) Brine solution Not Affected.
 - 2) Sugar solution Not Affected.
 - 3) Milk Not Affected.
 - 4) 10% Citric Acid Not Affected.
 - 5) 3.5 percent HCl Acid: Not affected.
 - 6) 5% Acetic Acid: Not Affected
 - 7) 1% Alkali solution: Not Affected
 - 8) Urine: Not Affected
 - 9) Calcium chloride: Not Affected.
 - 10) Toluol Softens.

- g. Floor Tile Installation Evaluation (ASTM C627-81) 900 cycles
- h. Service Rating (TCNA) Extra Heavy Duty
- 3. Acceptable products include the following, or approved equal:
 - a. Mapei product: "Mapelastic 315" with fabric reinforcing
 - b. Laticrete product "Laticrete 9235 Waterproofing".
 - c. Custom Building Products "9240 Waterproofing"
 - d. Bostik Corp. (Hydroment), product "Black Top 90210".
 - e. TEC Specialty Construction Brands (HB Fuller), product "TEK Triple Flex".
- C. Anti-fracture membrane for crack suppression and substrate crack isolation. Two component system (liquid and fabric) complying with TCNA performance level: Extra Heavy Service".
 - 1. Acceptable products include the following, or approved equal:
 - a. Mapei product: "Plani/Lastic".
 - b. Laticrete product "Blue 92".
 - c. Custom Building Products "Crack Buster Pro" or Fracture Free
 - d. TEC product 1flex Crack Isolation Membrane.
 - e. Bostik Corp. (Hydroment), product "Hydroment Gold".

2.4 GROUTING MATERIALS

- A. Grout for walls having joints less than 1/8 inch width: Acrylic modified Portland cement (unsanded) grout conforming to ANSI 118.6.
 - 1. Manufacturer: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Mapei product: "Ker-800" with acrylic latex additive "Plastijoints",
 - b. Laticrete product "Laticrete 1600 Series (unsanded) with admix 1776 antimicrobial.
 - c. Custom Building Products PolyBlend unsanded grouts.
- B. Grout for walls having joints 1/8 inch and greater width: Acrylic modified Portland cement sanded grout conforming to ANSI 118.6.
 - 1. Manufacturer: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Mapei product: "Ultracolor" with acrylic latex additive "Plastijoints",
 - b. Laticrete product "Laticrete 1500 Series (sanded) with admix 1776 antimicrobial.
 - c. Custom Building Products PolyBlend sanded grouts.

2.5 ACCESSORIES

- A. Edge strips at walls and corner trim: Equal to Schlüter Systems L.P., product series “Jolly”, in height as required for tile thickness, fabricated from extruded aluminum with satin nickel anodized finish and integrated joint spacer.
- B. 135 degree corner trim: Equal to Schlüter Systems L.P., product series “Deco DE”, in width as required for tile thickness, fabricated from extruded aluminum with satin nickel anodized finish.
- C. Grout Sealer: Manufacturer's silicone product for sealing grout joints and that does not change color or appearance of grout.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
 - b. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
 - c. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify that all concrete substrates are at least 28 calendar days old, completely cured and free of negative hydrostatic conditions or moisture problems.
- B. Beginning of installation means acceptance of substrate and site conditions.

3.2 PREPARATION

- A. During the operation of work of this Section, protect surrounding in situ materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- B. Ensure that all anchors, plugs, electrical and mechanical work to be in or underneath tile have been installed.
- C. Vacuum clean substrate surfaces.

3.3 INSTALLATION - GENERAL REQUIREMENTS

- A. Installation Standards: The American National Standard Specifications for the Installation of Ceramic Tile, 1992 edition (ANSI A108), is hereby made a part of this specification. All work of this Section shall be installed in accordance with the requirements contained in referenced ANSI A108 standards, and as additionally

specified below, and in accordance with the manufacturer's specifications of those products used.

- B. Installation Methods: Schedule of substrate conditions, generic type of tile used, with appropriate setting and grouting methods are listed at end of this Section.
 - 1. Use trowel shapes and sizes as recommended by setting materials manufacturer.
 - 2. Back-butter tiles as required to provide coverage indicated.
 - 3. Back-butter tiles as required to provide coverage indicated, except for tiles exceeding 144 square inches which require a complete back application of mortar.
- C. Tile Patterns and types: Tile patterns are shown on the Drawings, if more information is required, obtain the necessary information from the Architect. Do not interrupt tile pattern around openings.
- D. Tile Layout and installation
 - 1. Layout tile on room axis, leaving equal sized border units of not less than one-half tile width.
 - 2. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly.
 - 3. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, full without voids, cracks, excess mortar, or excess grout.

3.4 INSTALLATION OF CONTROL JOINTS

- A. General: Provide control joints where indicated on the Drawings, and as directed by the Architect. Where not indicated, provide joints per the following requirements in specific locations approved by Architect:
 - 1. Interior tilework: 24 to 36 feet in each direction, except where exposed to direct sunlight or moisture.
 - 2. Interior tilework exposed to direct sunlight or moisture: 12 to 16 feet in each direction.
 - 3. Where tile abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, and where changes occur in substrate materials.
 - 4. At perimeter walls in rooms and spaces larger than 12 feet on one side.
 - 5. As continuation of expansion joints, control joints, and seismic joints in the building structure which occur in tile areas.
- B. Locations: Verify exact locations of joints with Architect prior to commencing tile installation.
- C. Control joints:
 - 1. Form control joints neat, straight, and uniformly wide equal to width of normal tile joint. Cut tile neatly and to accurate radius at exposed junction with pipes, etc.
 - 2. Extend control joints full thickness of tile, setting bed and reinforcing.

- D. Keep open joints free of grout and debris until filled with sealant. Install non-contaminating temporary joint filler to maintain joints in clean condition until installation of joint backing and sealant under Section 07 92 00 - JOINT SEALANTS.

3.5 WALL TILE INSTALLATION - TCNA NUMBER W244C WITH THIN-SET

- A. General: Install in accordance with ANSI A108.5, TCNA installation method number W244C, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.
 - 1. Setting materials: Latex modified Portland cement (ANSI A118.4).
 - 2. Grout materials: Acrylic modified Portland cement (unsanded) grout (ANSI A118.6).
- B. Install latex modified Portland cement mortar bed to a thickness recommended by manufacturer.
- C. Grouting:
 - 1. Allow tile to fully set prior to grouting; do not grout in less than 24 hours after installation of tile.
 - 2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.

3.6 SHOWER TILE INSTALLATION - TCNA NUMBER B415 WITH THIN-SET AND WATERPROOFING MEMBRANE

- A. General: Install in accordance with ANSI A108.5, TCNA installation method number B415, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.
 - 1. Waterproofing membrane: Complying with German national standard (DIN18156, part 2), and ASTM C627.
 - 2. Setting materials: Latex modified Portland cement (ANSI A118.4).
 - 3. Grout materials: Acrylic modified Portland cement (unsanded) grout (ANSI A118.6).
- B. Apply waterproofing membrane over cement backer board substrate.
- C. Install latex modified Portland cement mortar bed to an 1/8 inch thickness, or as otherwise recommended by manufacturer.
- D. Grouting:
 - 1. Allow tile to fully set prior to grouting; do not grout in less than 24 hours after installation of tile.
 - 2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.

3.7 INSTALLATION – METAL EDGE AND TRANSITION STRIPS

- A. General: Install in accordance with ANSI A108.5, TCNA installation method number F113, and as additionally specified herein below. Apply materials in strict

accordance with the written instructions and recommendations of setting materials manufacturer.

1. Ensure that top surface of metal edge and transition strips align with surface plane of tile.

- B. Grouting: Install in accordance with installation requirements of abutting tile.
- C. Press perforated anchoring leg of trim into troweled dry set mortar bedding. Trowel additional mortar over perforated anchoring leg of trim to ensure full coverage and support of tile edges.
- D. Solidly embed tiles in manner that tiled surface is flush with top of trim profile. Tile may exceed trim height by 1/32 inch [1 mm] to 1/16 inch [1.5 mm], but tile may not be installed lower than height of trim. Maintain a 1/8 inch [3 mm] minimum uniform joint width between edge of tile and metal trim to be filled by grout.

3.8 INSTALLATION - GROUT

- A. Remove spacers, ropes, glue, and similar foreign matter prior to grouting.
- B. Force the maximum amount of the approved grout into joints in accordance with pertinent recommendations contained in ANSI A108.10.
- C. Fill in joints of cushion-edge tile to depth of the cushion; fill joints of square-edge tile flush with the surface.
- D. Fill all gaps and skips. Do not permit mortar or mounting mesh to show through grouted joints.
- E. Provide hard finished grout which is uniform in color, smooth and without voids, pin holes, or low spots.
- F. Remove all excess grout immediately after installation thereof, wash and rinse tile free from grout film, and tool grout to a uniform density throughout.
- G. Seal all floor grout.

3.9 REPAIR

- A. Replace cracked chipped, broken, and otherwise defective tiles.
- B. Remove work not complying with requirements of the Contract Documents or the referenced standards, and promptly replace with work which does comply.

3.10 CLEANING

- A. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of mortar, grout, and other materials installed under this Section, and wash completed tile work.
 - 1. Do not use acid or acid cleaners to clean tile.
 - 2. When tile is thoroughly clean and dry, polish glazed tile with clean dry cloths.

3.11 PROTECTION

- A. Do not permit traffic over finished floor surface until grout and tile materials are fully set, and not less than 72 hours. Protect floor surfaces with heavy red-rosin paper or kraft paper. Remove and dispose of floor protection as directed by the Construction Manager.

End of Section

Section 09 30 19
PORCELAIN TILING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 03)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Sub Bid Requirements: As provided under Section 09 00 03 - TILE TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 03.

1.2 SUMMARY

- A. Furnish and install the following:
1. Porcelain wall tile.
 2. Installation systems, accessories, adhesives, mortars and grouts.
 3. Preparation of control joints to receive sealant in tiled work.
 4. Metal edge and transition strips.
- B. Install the following furnished under the designated Sections:
1. Install access panels into tiled walls as specified under Section 08 31 00 - ACCESS DOORS AND PANELS.
- C. Perform drilling and cutting in tile surfaces, as required to accommodate penetrating items of other trades, from templates and instructions furnished by the respective trades.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete slab substrate.
- F. Section 07 92 00 - JOINT SEALANTS: Backer rod and sealant at control joints.
- G. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: access panels, occurring in partitions and walls.
- H. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Metal stud framing to receive cementitious backer board installed under this Section.
- I. Section 09 29 00 – GYPSUM BOARD: Backer panels to receive tile finish.
- J. Section 09 00 03 – TILE TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- K. Section 09 30 13 - CERAMIC TILING: Ceramic tile with setting systems, as part of this Trade Contract.
- L. Section 10 28 13 - TOILET ACCESSORIES: Furnishing toilet accessories and installation templates.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A108.1A - Installation of Ceramic Tile in the Wet Set Method, with Portland Cement Mortar.
 - 2. ANSI A108.1B - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
 - 3. ANSI A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
 - 4. ANSI A108.6 - Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy.
 - 5. ANSI A108.9 - Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout.
 - 6. ANSI A108.10 - Installation of Grout in Tilework.
 - 7. ANSI A118.1 - Dry-Set Portland Cement Mortar.
 - 8. ANSI A118.3 - Chemical-Resistant, Water-Cleanable, Tile Setting and Grouting Epoxy and Water-Cleanable Tile Setting Epoxy Adhesive.
 - 9. ANSI A118.4 - Latex-Portland Cement Mortar.
 - 10. ANSI A118.6 - Ceramic Tile Grouts.

11. ANSI A118.8 - Modified Epoxy Emulsion Mortar/Grout.
12. ANSI A137.1 - Specifications for Ceramic Tile.
13. TCA Handbook for Ceramic Tile Installation, latest edition.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 – SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Include maintenance data and recommended cleaning materials, and cleaning and stain removal methods.
 2. Selection samples:
 - a. Manufacturer's sample boards for each type and color group of tile specified, and grout colors, for selections by the Architect.
 3. Verification samples:
 - a. Mount tile and apply grout on one 24 by 24 inch cement backerboard board, for each tile type and selected color, to indicate color and texture variations, tile flatness and joint size variations.
 - b. Trim shapes and base, in selected colors in types and shapes indicated for project conditions.
 4. Grade Certificates: Manufacturer's Master Grade Certificates submitted prior to shipment of tile to project.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

- f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- g. Include submittal documentation requirements for MR Credit 4 Building Product Disclosure and Optimization – Material Ingredients for HPDs.

1.6 QUALITY ASSURANCE

- A. Conform to ANSI/TCA A 137.1 and TCA Handbook for Ceramic Tile Installation.
- B. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.
- C. Tiles delivered to the job or installed in the work which do not fall within the accepted color and texture range demonstrated by the samples shall be removed from the site and replace with acceptable materials.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver tile in manufacturer's sealed cartons, grade-sealed by the manufacturer in accordance with ANSI A 137.1, with grade-sealed unbroken, and clearly marked as to contents, color, and quantity.
- B. Store and protect containers above floor level, keep dry until ready for use.
- C. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions. Store epoxy mortar and epoxy grouts at 70 degrees Fahrenheit (21° C) temperature for 24 hours prior to use.

1.8 ENVIRONMENTAL CONDITIONS

- A. Do not install setting or grouting materials in a closed, unventilated environment. Ventilate propane or fossil fuel heaters to prevent damage to tile work from carbon-dioxide build up.
- B. Environmental conditions:
 - 1. General: Maintain ambient temperatures between 50 (10° C) and 80 (26° C) degrees Fahrenheit in tiled areas, for 24 hours prior to installation, during installation and for 7 days after completion.
 - 2. Special environmental conditions for epoxy setting and grout materials: Maintain ambient temperatures between 65 degrees Fahrenheit (18° C) and 80 degrees Fahrenheit (27° C) in tiled areas, for 24 hours prior to installation, during installation and for 7 days after completion.
 - 3. When temperature of substrate exceeds 90 (32° C) degrees Fahrenheit, contact manufacturer for instructions.

1.9 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.10 WARRANTY

- A. Provide 2 year, non pro-rated warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall provide for cracking, breakage or failure of tile due to defective workmanship.
 - 1. Materials must be compatible and from one source, single source responsibility for waterproofing, installation, Mortars and grouts. Job-site mixtures of sand portland cement and site dilution of additives shall not be permitted.
- B. Special Warranty: The Contractor warrants the work of this Section to be in accordance with the Contract Documents and free from faults and defects in materials and workmanship for a period of 5 years. This special warranty extends the period of limitations contained in the General Conditions. Have the warranty countersigned by the installer and manufacturer.
- C. The manufacturer of installation systems, adhesives, grouts and mortars shall provide a comprehensive non pro-rated written five (5) year warrantee against defective products which covers replacement materials and labor costs for demolition, tile accessories, and installation systems.
 - 1. Warranty to provide for tile lifting or separation from substrate, and setting bed/grout deterioration, when products have been installed with referenced TCA setting systems using specified setting and grout materials.
 - 2. Warranty excludes structural failure, movement or cracking of substrate materials, and workmanship performed not in accordance with manufacturer's instructions and industry standard guidelines.

1.11 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, deliver to the Owner extra materials in, an amount equal to 3 percent of tile and trim of each color, finish and type installed.
- B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work are limited to the following include the following, or approved equal:
 - 1. Porcelain tile:
 - a. Dal-Tile Corporation, Dallas, TX.
 - b. American Olean Tile Company, Lansdale PA.
 - c. Crossville Ceramics, Crossville TN.
 - d. Floor Gres (Cerim Ceramich) West Long Branch, NJ.
 - 2. Mortars, adhesives & Grouts:
 - a. Bostik Corp. (Hydroment), Middleton MA.
 - b. C-Cure Chemical Company, Inc., Houston TX

- c. Laticrete International, Inc., Bethany CT
 - d. Mapei Corporation, Elk Grove IL.
 - e. Custom Building Products, Inc., Seal Beach, CA.
3. Edging materials:
- a. Schlüter Systems L.P., Plattsburgh NY.
 - b. Ceramic Tool Company Inc., Waukesha WI.
 - c. Custom Building Products, Inc., Seal Beach, CA.

2.2 PORCELAIN TILE

- A. Porcelain tile: Dal-Tile Corporation, "Industrial Park Color Body Porcelain" or approved equal nominal 12 by 24 by 3/8, inch thick or 12 by 24 by 3/8 inch thick, as indicated on the Drawings, cushion-edges, in colors and finishes as selected by the Architect. To establish a standard of quality, design and function desired, Drawings and specifications have been based on the tile indicated. Products from other manufacturers meeting the requirements of these specifications with equivalent ranges of available color groups and pricing within those color groups shall be considered as equal upon submission of complete product information as described in Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES. Further additional information may be requested by the Construction Manager or Architect for determination that the proposed product substitution is fully equal to the specified product(s).
1. Provide tiles with "StepWise" or approved equal technology for improved cleanability.
 2. Colors and Patterns: Colors shall be as selected by Architect from full range of available colors.

2.3 SETTING MATERIALS

- A. Mortar for porcelain wall tile: complying the requirements of ANSI A118.4. Acceptable products include the following, or approved equal:
1. Mapei product: "Keracolor"
 2. Laticrete product number 4-XLT.
 3. Custom Building Products product: "Polyblend".

2.4 GROUTING MATERIALS

- A. Epoxy grout, heavy duty: Multi-component epoxy grout, conforming to ANSI 118.3 and ASTM C658.
1. Epoxy Grout shall be non-toxic, non-flammable, non-hazardous during storage, mixing, application and when cured and shall meet the following minimum physical requirements:
 - a. Compressive Strength (at 7 days per ASTM C579): 13,000 psi (89.7 MPa)min.
 - b. Shear Bond Strength (at 7 days per ASTM C321): Brick fails.
 - c. Water Absorption (ASTM C413): 0.15 percent maximum
 - d. Temperature resistance (continual): 185 degrees F. (85°C)
 - e. Temperature resistance (intermediate): 212 degrees F. (100°C)

2. The finished epoxy grout shall be chemically and stain resistant to catsup, mustard, tea, coffee, milk, soda, beer, wine, bleach (5% solution), ammonia, juices, vegetable oil, brine, sugar, cosmetics, and blood. It shall also be chemically resistant to dilute acids and alkalis, gasoline, turpentine, and mineral spirits.
3. Acceptable products include the following, or approved equal:
 - a. Mapei product: "Kerapoxy IEG" series".
 - b. Laticrete product "Latapoxy, 2000 Industrial Grout."
 - c. Custom Building Products" CEG 100% Solids Commercial Epoxy Grout".

2.5 ACCESSORIES

- A. Edge strips at walls and corner trim: Schlüter Systems L.P., product series "Jolly", in height as required for tile thickness, fabricated from extruded aluminum with satin nickel anodized finish and integrated joint spacer.
- B. 135 degree corner trim: Schlüter Systems L.P., product series "Deco DE", in width as required for tile thickness, fabricated from extruded aluminum with satin nickel anodized finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 1. Verify that all concrete substrates are at least 28 calendar days old, completely cured and free of negative hydrostatic conditions or moisture problems.
- B. Beginning of installation means acceptance of substrate and site conditions.

3.2 PREPARATION

- A. During the operation of work of this Section, protect surrounding in situ materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- B. Ensure that all anchors, plugs, electrical and mechanical work to be in or underneath tile have been installed.
- C. Vacuum clean substrate surfaces.
- D. Seal concrete substrate cracks with filler; level concrete substrate to acceptable flatness tolerances.
 1. The use of PVA bonding agents or gypsum based leveling materials is prohibited.

- E. Apply conditioner or primer to surfaces as recommended by adhesive manufacturer.

3.3 INSTALLATION - GENERAL REQUIREMENTS

- A. Installation Standards: The American National Standard Specifications for the Installation of Ceramic Tile, 1992 edition (ANSI A108), is hereby made a part of this specification. All work of this Section shall be installed in accordance with the requirements contained in referenced ANSI A108 standards, and as additionally specified below, and in accordance with the manufacturer's specifications of those products used.
- B. Installation Methods: Schedule of substrate conditions, generic type of tile used, with appropriate setting and grouting methods are listed at end of this Section.
 - 1. Use trowel shapes and sizes as recommended by setting materials manufacturer.
 - 2. Clean porcelain tiles (backs) and remove manufacturer's residue.
 - 3. Back-butter tiles as required to provide coverage indicated.
- C. Patterns and colors: Tile patterns are shown on the Drawings. The Tile Trade Contractor shall note the required final tile layouts including fields, striping, number of colors, and required cutting necessary to produce the representative pattern(s).
- D. Tile Layout and installation
 - 1. Layout tile on room axis, leaving equal sized border units of not less than one-half tile width.
 - 2. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align base and wall joints.
 - 3. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, full without voids, cracks, excess mortar, or excess grout.

3.4 INSTALLATION OF CONTROL JOINTS

- A. General: Provide control joints where indicated on the Drawings, and as directed by the Architect. Where not indicated, provide joints per the following requirements in specific locations approved by Architect:
 - 1. Interior tilework: 24 to 36 feet in each direction, except where exposed to direct sunlight or moisture.
 - 2. Interior tilework exposed to direct sunlight or moisture: 12 to 16 feet in each direction.
 - 3. Where tile abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, and where changes occur in substrate materials.
 - 4. At perimeter walls in rooms and spaces larger than 12 feet on one side.
 - 5. As continuation of expansion joints, control joints, and seismic joints in the building structure which occur in tile areas.
- B. Locations: Verify exact locations of joints with Architect prior to commencing tile installation.

- C. Control joints:
 - 1. Form control joints neat, straight, and uniformly wide equal to width of normal tile joint. Cut tile neatly and to accurate radius at exposed junction with pipes.
 - 2. Extend control joints full thickness of tile, setting bed and reinforcing.
 - D. Keep open joints free of grout and debris until filled with sealant. Install non-contaminating temporary joint filler to maintain joints in clean condition until installation of joint backing and sealant under Section 07 92 00 - JOINT SEALERS.
- 3.5 WALL TILE INSTALLATION - TCNA NUMBER W243 (MODIFIED)
- A. General: Install in accordance with ANSI A108.5, TCNA installation method number W243, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.
 - 1. Setting materials: Latex modified Portland cement (ANSI A118.4).
 - 2. Grout materials: Acrylic modified Portland cement (unsanded) grout (ANSI A118.6).
 - B. Install latex modified Portland cement mortar bed to a thickness recommended by manufacturer.
 - C. Grouting:
 - 1. Allow tile to fully set prior to grouting; do not grout in less than 24 hours after installation of tile.
 - 2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.
- 3.6 INSTALLATION – METAL EDGE AND TRANSITION STRIPS
- A. General: Install in accordance with ANSI A108.5, TCNA installation method number F113, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.
 - 1. Ensure that top surface of metal edge and transition strips align with surface plane of tile.
 - B. Grouting: Install in accordance with installation requirements of abutting tile.
 - C. Press perforated anchoring leg of trim into troweled dry set mortar bedding. Trowel additional mortar over perforated anchoring leg of trim to ensure full coverage and support of tile edges.
 - D. Solidly embed tiles in manner that tiled surface is flush with top of trim profile. Tile may exceed trim height by 1/32 inch [1 mm] to 1/16 inch [1.5 mm], but tile may not be installed lower than height of trim. Maintain a 1/8 inch [3 mm] minimum uniform joint width between edge of tile and metal trim to be filled by grout.
- 3.7 INSTALLATION - GROUT
- A. Remove spacers, ropes, glue, and similar foreign matter prior to grouting.

- B. Force the maximum amount of the approved grout into joints in accordance with pertinent recommendations contained in ANSI A108.10 and for epoxy grouts, ANSI A108.6.
- C. Fill in joints of cushion-edge tile to depth of the cushion; fill joints of square-edge tile flush with the surface.
- D. Fill all gaps and skips. Do not permit mortar or mounting mesh to show through grouted joints.
- E. Provide hard finished grout which is uniform in color, smooth and without voids, pin holes, or low spots.
- F. Remove all excess grout immediately after installation thereof, wash and rinse tile free from grout film, and tool grout to a uniform density throughout.

3.8 REPAIR

- A. Replace cracked chipped, broken, and otherwise defective tiles.
- B. Remove work not complying with requirements of the Contract Documents or the referenced standards, and promptly replace with work which does comply.

3.9 CLEANING

- A. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of mortar, grout, and other materials installed under this Section, and wash completed tilework.
 - 1. Do not use acid or acid cleaners to clean tile.
 - 2. When tile is thoroughly clean and dry, polish glazed tile with clean dry cloths.

3.10 CURING

- A. Damp cure all tile installations, including portland cement grouts, for 72 hours minimum.
- B. Cover with clean non-staining 40 pound kraft paper. Do not use polyethylene sheets directly over tile on horizontal surfaces.

3.11 PROTECTION

- A. Do not permit traffic over finished floor surface until grout and tile materials are fully set, and not less than 72 hours. Protect floor surfaces with heavy red-rosin paper or kraft paper. Remove and dispose of floor protection as directed by the Construction Manager.

End of Section

Section 09 51 00
ACOUSTICAL CEILINGS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 09 51 00 – ACOUSTICAL CEILINGS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
 2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the

following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.
 2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3,

TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.

3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section. The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 SUMMARY

- A. Work Included: The scope of work, without limiting the generality thereof, consists of furnishing all labor, materials, plant, transportation, equipment, accessories, appurtenances, and services necessary and/or incidental to the proper completion of all acoustical ceiling work shown on the Drawings, described in the Specifications, or as reasonably inferred from either, in the opinion of the Designer, as being required, and includes:
 1. Acoustical ceiling systems including suspension systems.
- B. The work of this Section consists of acoustical and suspended where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- C. Furnish and install the following:
 1. Suspended acoustical tile ceiling including suspension system and associated edge moldings.
 2. Furnish and install joint sealant at ceiling edge angles where abutting walls.
 3. Furnish and install decorative suspended ceiling systems.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will

be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.4 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.5 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.
- F. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.
- G. Section 09 22 16 – NON-STRUCTURAL METAL FRAMING: Metal ceiling and soffit framing for gypsum board, including hanger attachments, wire hangers, and screwable metal tee grid system.
- H. Section 09 29 00 - GYPSUM BOARD: Suspended drywall construction ceilings and soffits.
- I. Division 21 - FIRE SUPPRESSION: Sprinkler heads in ceiling system.
- J. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Air diffusion devices in ceiling.
- K. Division 26 - ELECTRICAL:
 - 1. Fire alarm and smoke detection equipment mounted in ceiling system.

2. Light fixtures and independent hangers for suspended fixtures.

1.6 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 1. ASTM A 641 - Zinc-Coated (Galvanized) Carbon Steel Wire
 2. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method "UL Classified".
 3. ASTM C 523 - Light reflectance of Acoustical Material by the Integrating Sphere Reflectometer.
 4. ASTM C 635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 5. ASTM C 636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 6. ASTM E 84 - Surface Burning Characteristics of Building Material "UL Classified"
 7. ASTM E 119 - Fire Tests of Building Construction and Materials "UL Classified".
 8. ASTM E 413 - Classification for Rating Sound Insulation.
 9. ASTM E 580 - Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
 10. ASTM E 1264 - Classification of Acoustical Ceiling Products.
 11. ASTM E 1414 - Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum. "UL Classified".
 12. UL Fire Resistance Directory and Building Material Directory.
 13. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.
- B. General References The following reference materials are hereby made a part of this Section by reference thereto:
 1. Cisca (Ceilings and Interior Systems Contractors Association) - Acoustical Ceilings: Use and Practice.

1.7 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
 2. Be responsible for establishing locations and levels for all work of this Section, except such parts as may be delivered to others and set by them. In such cases assist them in properly locating said parts.
- B. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with

requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Architect, General Contractor, Installer's Project Superintendent, manufacturer's technical representative and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
 - a. Section 09 22 16 – NON-STRUCTURAL METAL FRAMING
 - b. Section 09 29 00 - GYPSUM BOARD
 - c. Division 21 - FIRE SUPPRESSION.
 - d. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING.
 - e. Division 26 - ELECTRICAL
2. Agenda:
 - a. Scheduling of suspended ceiling operations.
 - b. Review of staging and material storage locations.
 - c. Coordination of work by other trades.
 - d. Installation procedures for ancillary equipment.
 - e. Protection of completed Work.
 - f. Establish weather and working temperature conditions to which Architect and Contractor must agree.
 - g. Discuss process for manufacturer's inspection and acceptance of completed Work of this Section.

C. Sequencing:

1. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
2. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, to allow work which will be concealed by the ceilings to be completed prior to commencing installing the ceilings in such locations.

D. Scheduling:

1. Install acoustical units after interior wet work is dry.
2. Schedule work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead work is completed, tested and approved.

1.8 SEQUENCING

- A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

- B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

1.9 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 - 2. Shop Drawings:
 - a. Plans of each room in scale to match Contract Drawings; indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to the system.
 - b. All drawings bearing dimensions of actual measurements taken at the project.
 - c. Large scale installation details of special conditions.
 - 3. Verification Samples:
 - a. 4 by 4 inch samples of acoustical units, illustrating material and finish.
 - b. 12 inch long samples of suspension system components including main runners, cross runner and edge trim.
 - 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Ceiling and Wall Systems (gypsum board products, insulation, acoustical ceiling systems and wall coverings) to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: SCS Indoor Advantage Gold; UL Greenguard Gold.

- e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
 - g. Include submittal documentation requirements for MR Credit 4 Building Product Disclosure and Optimization – Material Ingredients for HPDs.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and guarantees as specified elsewhere herein this Section.
- C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
- 1. Provide to the Owner, extra ceiling panel and suspension components, 5 percent of each type installed.
- 1.10 QUALITY ASSURANCE
- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of acoustical ceiling panels.
- 1.11 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Do not deliver acoustical ceiling panels to the project until all concrete, masonry, plaster and other wet work has been completed and dry.
 - 3. Deliver acoustical ceiling panels in original, unopened packages and store protected in a fully enclosed space.
 - B. Storage and Handling Requirements:
 - 1. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - C. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.12 SITE CONDITIONS

- A. General Contractor shall maintain uniform temperature of minimum of 60 degrees Fahrenheit and humidity of 20 to 40 percent prior to, during, and after installation.

1.13 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manufacturer Warranty:
1. In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Construction Manager may have by law or other provisions of the Contract Documents.

1.14 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, deliver to the Owner extra ceiling tiles and suspension framing for future repairs and maintenance, from the same manufacturer as those installed, in the following amounts.
1. Acoustical ceiling tiles: 5 percent of each type and color, installed.
 2. Suspension framing: 50 linear feet of each type and color utilized on the project.
 3. Perimeter edge trim: 50 linear feet of each type and color utilized on the project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Acoustical ceiling panel:
 - a. Armstrong World Industries, Inc., Lancaster, PA.
 - b. USG Interiors Inc., Chicago, IL.
 - c. Certainteed Corporation, Valley Forge, PA.
 - d. Hunter Douglas Architectural Products Inc., Norcross, GA.
 - e. Gordon, Inc., Interior Specialties Division, Bossier City, LA.
 - f. Rockfon, LLC, Chicago, IL.
 2. Suspension system:
 - a. Armstrong World Industries, Inc., Lancaster, PA
 - b. USG Interiors Inc., (Donn®) Chicago, IL.
 - c. Chicago Metallic Corp., Chicago, IL

d. Hunter Douglas Architectural Products Inc., Norcross, GA.

2.2 DESCRIPTION

- A. General Description: Manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance as indicated.
 - 1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.
- B. Sustainability Requirements:
 - 1. Recycled content of acoustical ceiling panels: Use maximum available percentage of materials by weight. Products incorporated into the work shall contain not less than 50 percent of recycled content.
 - 2. Recycled content of steel used in grid framing: Use maximum available percentage of recycled steel. Steel framing products incorporated into the work shall contain not less than 25 percent of recycled steel.

2.3 PERFORMANCE/DESIGN CRITERIA

- A. Fire Resistance: Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire-resistance ratings have been tested in compliance with ASTM E 119 by independent agencies acceptable to the Architect and authorities having jurisdiction.
- B. Surface Burning Characteristics: Provide UL Classified material whose surface burning characteristics, when tested in compliance with ASTM E 84 are Class A.
- C. Where the following ratings are specified, provide materials and construction which are identical to those tested by Underwriters Laboratories or equivalent independent testing agencies acceptable to the Architect.
 - 1. Noise Reduction Coefficient (NRC): Ratings have been tested in compliance with ASTM C423.
 - 2. Ceiling Attenuation Class (CAC): Ratings have been tested in accordance with ASTM E1414.
 - 3. Light Reflectance (LR): Ratings has been tested in compliance with ASTM C523.

2.4 ACOUSTICAL CEILING PANELS

- A. Type ACT-1 ceiling panel (Typical):
 - 1. Panel size: 24 by 24 inch by 3/4 inch thick.
 - 2. Panel edge: Panel edge: Shadowline tapered (SLT) edge.
 - 3. Description: ASTM E-1264 Type IV, Form 1 and 2, Pattern E, G, Class A flame spread.
 - 4. Color: White.
 - 5. Minimum light reflectance range: LR 0.89.
 - 6. Acoustical characteristics:

- a. NRC: 0.70.
 - b. CAC: 35.
 7. Acceptable products:
 - a. Armstrong: "Ultima" Number 1911.
 - b. CertainTeed product: "Symphony M" Number 1222B-OVT-1.
 - c. USG product "Mars ClimaPlus" Number 86785.
- B. Type ACT-1A ceiling panel (Typical):
1. Panel size: 24 by 48 inch by 3/4 inch thick.
 2. Panel edge: Panel edge: Shadowline tapered (SLT) edge.
 3. Description: ASTM E-1264 Type IV, Form 1 and 2, Pattern E, G, Class A flame spread.
 4. Color: White.
 5. Minimum light reflectance range: LR 0.89.
 6. Acoustical characteristics:
 - a. NRC: 0.70.
 - b. CAC: 35.
 7. Acceptable products:
 - a. Armstrong: "Ultima" Number 1911.
 - b. CertainTeed product: "Symphony M" Number 1222B-OVT-1.
 - c. USG product "Mars ClimaPlus" Number 86785.
- C. Type ACT-2 ceiling panel (Kitchen and Culinary Arts):
1. Panel size: 24 by 24 inch by 1/2 inch thick.
 2. Panel edge: Square edge.
 3. Description: ASTM E-1264 Type XX, Pattern G, Class A flame spread.
 4. Color: White.
 5. Minimum light reflectance range: LR 0.77.
 6. Acoustical characteristics:
 - a. NRC range: N/A.
 - b. CAC range: 40.
 7. Acceptable products:
 - a. National Gypsum product "Gridstone Fire-Shield Gypsum Ceiling Panel".
 - b. CertainTeed product: "Vinylrock." Number 1140-CRF-1.
 - c. USG product "Sheetrock Lay-In Ceiling Panel ClimaPlus." Number 3260.
- D. Type ACT-3 ceiling panel, (Band/Choral Rooms and Piano Labs):
1. Panel size: 24 by 24 inches.
 2. Panel edge: Square.
 3. Description: ASTM-1264 Type XII, Form Z, Pattern E, Fire Class A.
 4. Color: White.

5. Minimum light reflectance range: LR 0.90.
 6. Acoustical characteristics:
 - a. NRC range: 0.90
 - b. CAC: N/A.
 7. Acceptable Products:
 - a. Armstrong "Optima" square lay-in, product number 3150.
 - b. USG "Halcyon Climaplus", product number 97221.
 - c. Approved equal.
- E. Type ACT-4 ceiling panel (Locker Rooms): "Tectum" Lay-In Panels or approved equal 24 by 24 inch by 1 inch thick; square edge; aspen wood fibers bonded with inorganic hydraulic cement; flat white color.
- F. Type ACT-5 ceiling panel (Pre-K, Early Childhood):
1. Panel Size: 24 inches by 24 inches by 1-1/8 inch.
 2. Panel edge: Reveal.
 3. Color: White.
 4. Description: ASTM-1264, Type XX, Pattern E, Fire Class A.
 5. Flame spread: 25 or less.
 6. Smoke developed: 50 or less.
 7. Minimum light reflectance range: LR 0.90.
 8. Acoustical characteristics:
 - a. NRC range: 0.65
 - b. CAC: minimum 40
 9. Accessories: mounting rail connectors, suspension clips, wall moldings, end caps and accessory panels available for sprinklers, lighting and other ceiling devices.
 10. Acceptable products:
 - a. Certainteed "TufCore" composite ceiling; product number 1610B-IOF-1.
 - b. Kinetics Noise Control "Quiet Tile".
 - c. Approved equal.
- G. Type ACT-6 ceiling panel (Band/Choral Rooms and Piano Lab):
1. Panel size: 24 inch by 24 inch (thickness may vary per manufacturer).
 2. Description: Geometric offset pyramidal sound diffusers, Class A per ASTM E84, thermomold plastic units per ASTM C423.
 3. Acceptable products:
 - a. Kinetics Noise Control "Geometric Diffusers."
 - b. Approved equal.
- H. Type ACT-7 ceiling panel (Cafeteria and Serving):
1. Panel size: 24 by 24 inch.

2. Description: Flush tegular, micro-perforated 0.021 inch thick electro-galvanized steel panel, ASTM 1264, Type XX, Pattern C, Class A.
 - a. Flame spread: 25 or less.
 - b. Smoke developed: 50 or less.
 3. Pattern type: M2 perforated.
 4. Color: As selected by Architect from manufacturer's full range of available colors.
 5. Acoustic infill panel: Black bio-acoustic mineral fiber ceiling panel backing with a minimum NRC of 0.85.
 6. Acceptable products: Armstrong "Metalworks Tegular" product number 6461 or approved equal.
- I. Type ACT-8 ceiling panel (Cafeteria):
1. Panel size: 12 inches wide by 8 feet long by 5/8 inch high with 1-1/4 inch reveal.
 2. Panel edge: Square edge with extended flange.
 3. Description: Micro-perforated linear panel with plain border and acoustical fleece, ASTM 1264, Type XX, Pattern C, Class A.
 - a. Flame spread: 25 or less.
 - b. Smoke developed: 50 or less.
 4. Pattern type: M2 perforated.
 5. Color: As selected by Architect from manufacturer's full range of available colors.
 6. Acoustic infill panel: Black bio-acoustic mineral fiber ceiling panel backing with a minimum NRC of 0.85.
 7. Acceptable products: Armstrong "Metalworks Linear" product number 5571 or approved equal.
 8. Suspension system components: Armstrong Carrier Molding product number 5574 or approved equal.
- J. Type ACT-9 ceiling clouds (Cafeteria):
1. Size: As indicated on the Drawings, installed at various heights, 8 inch baffles.
 2. Color: As selected by the Architect from the manufacturer's full range of standard and premium colors and patterns (25 percent white, 75 percent from 5 custom colors in random amounts).
 3. Suspension system: Swivel suspension clip system as recommended by the manufacturer for individual or group suspension as indicated on the Drawings.
 4. Acceptable products:
 - a. Hunter Douglas product: "Luxalon V-Series Serpentine".
 - b. Gordon product: "Fin Mate Baffle Ceilings".
 - c. Rockfon product: "Intaline V Base".
- K. Type ACT-10 Ceiling panel (Auditorium Control Booth):
1. Panel size: 24 by 24 inch by 5/8 inch thick.

2. Panel edge: Square edge.
 3. Description: ASTM E-1264 Type III, Form 2, Pattern CE, UL Fire Resistance Labeled, wet formed mineral fiber, non-directional fissured, medium textured panel, non-combustible, vinyl latex paint finish.
 4. Color: Black.
 5. Minimum light reflectance range: LR 0.83 to 0.85.
 6. Acoustical characteristics:
 - a. NRC range: 0.55.
 - b. CAC range: 35 to 38.
 7. Acceptable products:
 - a. Armstrong product "Fine Fissured, Square Lay-In" product number 1831.
 - b. Certainteed product "Fine Fissured" product number PFF-157.
 - c. USG product "Radar Climaplus" with SQ edge, product number 2215.
- L. Type ACT-11 ceiling clouds (Auditorium):
1. Panel size: As indicated on Drawings.
 2. Panel edge: 4 inch high perimeter edge trim.
 3. Description: Aluminum, smooth texture, perforated metal paneling complying with ASTM 1264, Class A.
 - a. Flame spread: 25 or less.
 - b. Smoke developed: 50 or less.
 4. Pattern type: Perforated patterns as indicated on Drawings.
 5. Color: As selected by Architect from manufacturer's full range of available colors.
 6. Acoustic infill panel: Black bio-acoustic mineral fiber ceiling panel backing with a minimum NRC of 0.85.
 7. Acceptable products: Armstrong "Metalworks Torsion Spring" product number 7200 or approved equal.
 8. Suspension system components: AS recommended by the manufacturer for individual or group suspension as indicated on Drawings.

2.5 CEILING GRIDS

- A. Ceiling grid for ACT-1, ACT-3, ACT-4, ACT-6 and ACT-10: 15/16 inch exposed tee grid in white color matching ceiling panel. Acceptable products include the following, or approved equal:
1. Armstrong; 15/16" Prelude Exposed Tee System.
 2. Chicago Metallic; 200 Snap-Grid System.
 3. USG, Donn; DX Series.
 4. Celotex, 15/16" Release System.
 5. Colors:
 - a. ACT-1, ACT-3, ACT-4, ACT-6: White.
 - b. ACT-10: Black.

- B. Ceiling grid for ACT-2: 15/16 inch exposed grid, aluminum capped, G90 hot-dipped galvanized steel tee suspension system (or all aluminum tee system), in color matching ceiling tile. Provide with matching hemmed edge wall moldings having aluminum capping or all aluminum edge trim. Acceptable products include the following, or approved equal:
 - 1. Armstrong: Prelude Plus XL Exposed Tee System
 - 2. Chicago Metallic: 1830 Series.
 - 3. USG, Donn; ZXLA Series.

- C. Ceiling grid for ACT-5: 15/16 inch exposed grid, aluminum capped prefinished steel tee suspension system (or all aluminum tee system), in white color matching ceiling tile. Provide with matching hemmed edge wall moldings having aluminum capping or all aluminum edge trim. Exposed face color shall be white matching ceiling tile. Acceptable products include the following, or approved equal:
 - 1. Armstrong: AL Prelude Plus Exposed Tee System
 - 2. Chicago Metallic: 830 Series.
 - 3. USG, Donn; DX Series.

2.6 CEILING GRID PERIMETER EDGE TRIM SYSTEM

- A. Perimeter edge trim system at "Floating" suspended ceiling areas. Edge trim shall be nominal 4 inch and 10 inch height as indicated on Drawings, designed to accommodate straight edges as well as converse curved and convex curved edges as may be indicated on Drawings. Attachment to grid system is provided by a specially designed attachment clip, which snaps into the locks against hems of trim and is screw-attached to the bulb of the intersection suspension system member. Color shall be as selected by the Architect from the manufacturer's full range of standard and premium colors. Custom color(s) at Lobbies to match Architect's control sample. Independent sections of trim are joined together using the splice plate. Acceptable products are:
 - 1. Armstrong: Axiom Perimeter Trim and Transitions.
 - 2. Chicago Metallic: Infinity suspension trim.
 - 3. USG: Compasso Elite series.
 - 4. Colors:
 - a. Lobby: Custom.
 - b. Cafeteria and Auditorium: Match ceiling system from manufacturer's standard and premium colors.

- B. Size and profile: Refer to Drawings.

- C. Locations: As indicated on Drawings.

2.7 ACCESSORIES

- A. Sound absorption materials at Auditorium House Ceiling Panels: Owens Corning "Select Sound" black acoustic blanket or approved equal complying with the following requirements:
 - 1. 2 inch thickness.
 - 2. NRC = 0.95.

- B. Edge moldings: Standard edge trim: Grid system manufacturer's standard L-shape edge trim compatible with exposed grid system and color matched.
 - 1. Armstrong: Model 7800.
 - 2. Chicago Metallic: Model 1430.01.
 - 3. USG: Model M7.
- C. Hanger attachments: Of the most appropriate types for the specific receiving surfaces.
- D. Hanger rods: Black finished hanger ½ inch diameter threaded rods at ACT "Cloud" locations. Frequency of attachment as recommended by the manufacturer. Rods shall be set back from ceiling edge a minimum of 4 feet.
- E. Hangers: ASTM A641 Soft temper, pre-stretched galvanized carbon steel wire, with a yield stress of at least 3 times design load, but not less than 12 gage.
- F. Wall Angle Column Ring: Extruded aluminum alloy 6063 T5, with chemical conversion coating and clear anodized finish. Equal to Fry Reglet Corporation, Norcross, GA., Product: "Wall Angle Column Ring".
- G. Joint Sealer: One component acrylic latex caulking compound, conforming to FS 19-TP-21M and ASTM C 834 Type P, Grade NF, paintable within 24 hours after application, with a minimum movement capability of ±12.5 percent, equal to one of the following:
 - 1. BASF (Sonneborn), product, "Sonolac".
 - 2. Tremco, product, "Tremflex 834".
 - 3. Bostik, product, "Chem-Calk 600".
 - 4. Pecora, product "AC-20+".
- H. Sealant:
 - 1. Acoustical ceiling edge angle to irregular wall surfaces, Type AP.

2.8 SCAFFOLDS AND STAGING

- A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contract requiring such scaffolding.
 - 2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.

2.9 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.
- B. Surface Preparation:
 - 1. Carefully examine all receiving surfaces, to which attachments will be made hereunder, and determine the most practical way of making such attachments. Request Architect's approval of any attachment method which differs from that indicated on the approved shop drawings before proceeding with installation.
 - 2. Permit acoustical ceiling tile to reach room temperature and a stabilized moisture content prior to installation.

3.3 INSTALLATION

- A. Locate system on room axis, leaving equal sized border units. Minimum width and length of border units shall be 6 inches, unless otherwise approved by the Architect.
- B. Install all components of the suspended grid systems in accordance with the manufacturer's instructions, the approved shop drawings, conforming to ASTM C-636 requirements. Ensure a deflection not to exceed 1/360 span of 48-inch simple span.
- C. Install specified edge moldings wherever ceilings intersect a wall or partition surface, and around all items having any dimension of 4 inches or more which penetrate the ceilings, including circular penetrations. Set moldings absolutely level, using as long lengths as practicable, and secure with fasteners recommended by manufacturer for the type of substrate.
 - 1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.

2. Screw-attach moldings to substrate at intervals not over 16 inches on center, and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.
- D. Install hanger attachments to overhead construction in accordance with the approved shop drawings, spacing the attachments not more than 48 inches on centers over location of each main tee member.
 1. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers to span the extra distance.
 2. Install hanger wire to attachments with triple twists.
 - E. Install main tees parallel to the long dimension of each area, spacing the tees 48 inches on centers. Secure the bottom of hanger wires through slots in the main tee members and tie with triple twists. Level the main tees as the work progresses.
 - F. Uniformly space the cross tees at 24 inches on centers, and secure the cross tees into the main tees as recommended by the system manufacturer.
 - G. Provide sealant at gaps between new acoustical ceiling edge angles and all irregular walls.
 - H. Fit acoustical ceiling tile units in place, free from damaged edges or other defects detrimental to appearance and function. Install acoustical ceiling tile level, in uniform plane, and free from twist, warp or dents.
 1. Field cut tegular type tile with a tegular reveal at all edge conditions.
 2. Where required by governmental agencies having jurisdiction, install retention clips, provide two clips per ceiling panel installed on opposite sides of panel.
- 3.4 TOLERANCES
- A. Maximum variation from flat and level surface: 1/8 inch in 10 feet.
 - B. Maximum variation from plumb of grid members caused by eccentric loads: 2 degrees.
- 3.5 CLEANING
- A. Properly clean surfaces of panels and open grids free from dirt and handling marks. Wherever surfaces cannot be cleaned by normal methods or have defects, remove and replace with new components.
 - B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
 - C. Clean work under provisions of Section 01 73 00 – EXECUTION.
- 3.6 PROTECTION
- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

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Section 09 64 66
WOOD ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Prepare substrates to receive flooring as required to ensure specified tolerance level for finish surface of all work required by this Section. Preparation work includes patching, smoothing and leveling substrate, including:
 - 1. Grinding down high spots of substrate.
 - 2. Providing portland cement-based latex filler.

- B. The work of this Section consists of wood athletic flooring where shown on the Drawings, as specified herein, and as additionally required for a complete and proper installation. Work includes, but is not limited to the following.
 - 1. Aluminum transition threshold between wood athletic flooring and synthetic flooring.
 - 2. Provide sealants at all penetrations through the vapor barrier.
 - 3. Provide vapor retarder and new wood athletic flooring system at Gymnasium.
 - 4. Perform complete sanding and finishing operations for exposed to view surfaces of all wood flooring and other wood items to be furnished hereunder.
 - 5. Vented wall base and aluminum plate thresholds. Provide all complete coordination details at transition to synthetic flooring system, doorways, special conditions, including all special wall angles, strips and fillers.
 - 6. Painting of game lines at Gymnasium.
 - 7. Provide additional support blocking, substrate system at the bleacher roller points.

- C. Install the following furnished under the designated Sections:
 - 1. Volleyball sleeves for standards, (uprights) at Gymnasium furnished under Section 11 66 23 – GYMNASIUM EQUIPMENT and installed under this Section 05 50 00.
 - 2. Floor sleeves, boxes, transitions furnished by other sections for installation under this Section 09 64 66.

- D. Finish wood strip flooring, wood athletic flooring, stair treads and risers, and nosing platform furnished by Sections 06 40 00 – ARCHITECTURAL WOODWORK, 09 64 29 – WOOD STRIP AND PLANK FLOORING, and 09 64 66 – WOOD ATHLETIC FLOORING.

- E. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors

of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED SECTIONS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Preparation of concrete slab to receive sleeves, (inserts) for volleyball standards into floor.
- F. Section 03 54 00 – CAST UNDERLAYMENT: Providing concrete substrate to receive flooring.
- G. Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING: General preparation and testing requirements of flooring substrate.
- H. Section 09 05 63 – MOISTURE VAPOR EMISSION CONTROL: Moisture mitigation of concrete slabs.
- I. Section 12 66 13 – TELESCOPING BLEACHERS: Blocking for bleacher rollers.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. FSC (Forest Stewardship Council): "FSC Certification Program"
 - 3. FS MM-L-736 - Lumber; Hardwood.
 - 4. NFSHSA - Basketball rule Book.
 - 5. NFSHSA - Volleyball rule Book.
 - 6. MFMA – Floor Finish List and Specifications
 - 7. MFMA – Sanding, Sealing, Court Lining and Finish Maple Gym Floors
 - 8. MFMA – Grading Rules
 - 9. WSFI - Recommendations for the Correct Preparation, Finishing, and Testing of Concrete Subfloor Surfaces to Receive Wood Flooring.
 - 10. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data for each type of wood flooring and finish system materials, with manufacturer's installation instructions and recommended maintenance procedures.
 2. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 - a. Chain-of-Custody: Written documentation providing evidence of compliance with Chain-of-Custody supply of wood products, and compliance with FSC standards.
 - 1) Demonstrate that products are FSC-certified by providing vendor invoices. Invoices will contain the vendor's chain of custody number and identify each chain of custody certified product on a line-item basis. A "vendor" is defined as the company that furnishes wood products to project contractors and/or subcontractors for on-site installation.
 - b. Composite Wood and Agrifiber Products: Include certification indicating compliance with the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda for all composite wood and agrifiber products.
 3. Manufacturer's warranties: Wood flooring and finish system manufacturers' standard written guarantees covering defects in materials and workmanship, clearly defining the terms included in the coverage.
 4. Shop drawings:
 - a. Measured plan drawing indicating all game lines. Identify color of lines.
 - b. Large scale drawing of center court school logo.
 - c. Section showing vented base, and section showing transitions with abutting flooring materials.
 5. Verification samples: Finished 24 by 24 inch section of completed flooring with all components.
 6. Manufacturer's shall submit an independent third party suitability report indicating conformance with all performance criteria specified in DIN 18032 Part 2(2001), EN 14904, MFMA Standards.
 7. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product

Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
 - f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - g. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
- 1. Maintenance data: Include manufacturer’s recommended maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stripping, and re-finishing, stain removal methods, and polishes and waxes.
 - 2. MFMA - Care and Preservation of Your Wood Floors.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Companies specializing in manufacturing the products specified in this Section, each with minimum 5 years documented experience.
- B. Installer specializing in applying the work of this Section with a minimum of 5 years documented experience of the type of flooring system specified.
- C. Perform work in accordance with MFMA.
- D. Sustainability Standards Certifications:
 - 1. Chain of Custody wood products: All wood products furnished under this Specification Section shall be “FSC certified” according to the rules of the Forest Stewardship Council (FSC).
 - a. FSC Certification includes the following certification bodies of forests and forest products:
 - 1) Certification Systems.
 - 2) SmartWood.
 - 3) SGS Qualifor.

- 4) Soil Association.
 - b. Wood products lacking acceptable documentation for Chain of Custody, will be rejected and their removal required.
- 1.6 REGULATORY REQUIREMENTS
- A. Conform to applicable codes for Class 1 flame spread rating of finished floor surface when tested in accordance with ASTM E 84. Provide certificate of compliance from authority having jurisdiction.
- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Deliver wood flooring a minimum of 7 days prior to installation to allow materials moisture content to stabilize to ambient conditions. Do not deliver wood until all concrete, masonry, plaster and other wet work is complete and dry, and ambient air at installation space has moisture content stabilized.
 - B. Protect wood flooring from excessive moisture in shipment and handling; store all materials in an elevated, protected, and dry location.
- 1.8 PROJECT CONDITIONS
- A. Maintain ambient temperature between 55 and 80 degrees Fahrenheit, with a relative humidity of between 35 and 50 percent for 48 hours prior to delivery and storage of the flooring materials at the area; maintain such conditions throughout the installation and finishing period, and thereafter until Owner's Final Acceptance or Owner's occupancy.
- 1.9 SEQUENCING AND SCHEDULING
- A. Sequence work to ensure wood flooring is not delivered until building is enclosed, sufficient heat is provided, and proper humidity conditions can be maintained.
 - B. Install wood flooring after interior wet work is complete and fully cured, and ambient air at installation space has a moisture content stabilized.
- 1.10 WARRANTIES
- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 - B. Provide manufacturer's 5 year total system warranty (including vapor barrier) under provisions of the Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include coverage for all costs to repair or replace flooring, which shrinks, warps, cracks, or otherwise deteriorates excessively, or which breaks its anchorage, or bond with substrate, or otherwise fails. Warranty shall cover failures due to materials or workmanship. The Installer is not responsible for failure due to excessive moisture penetration through concrete substrate or other similar causes for failure which are beyond the Work of this Section, except verification of acceptable substrates, specified herein.

PART 2 - PRODUCTS

2.1 FLOOR SYSTEM

- A. Specified manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Robbins, Inc, Wausau, WI products:
 - 1. Gymnasium floor: "Bio-Channel Star".
- B. Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Robbins, Inc., Cincinnati, OH, product "Bio-Channel Star".
 - 2. Action Floor Systems, Inc., Mercer WI, product "Anchor Flex".
 - 3. Aacer Floor Company, Peshtigo, WI, product "Aacer Channel VLP".
 - 4. Connor Sport Court International, Amasa, MN, product "Connor S Channel".
 - 5. Horner Flooring Co. Dollar Bay, MI

2.2 FLOORING MATERIALS

- A. Sustainable Forest Certification: All wood shall be "Chain-of-Custody" certified as FSC Certified.
- B. Vapor barrier: Free-standing, dimensionally stable, 4-ply composite product, engineered as a moisture suppression membrane for use on concrete complying with the following requirements:
 - 1. Mold, mildew and fungal resistance when tested in accordance with ASTM D3273: 10 rating
 - 2. Moisture Vapor Transmission rate when tested in accordance with ASTM E96: less than 0.01 g/hrs/m²
 - 3. Specified manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Halex Corporation, Ontario, CA, product "VersaShield MBX Flooring Underlayment" or approved equal.
- C. Subfloor system:
 - 1. Resilient layer: 9/16 inch thick profiled shock pad equal to Robbins "Profiled Zero/G Shock Pad".
 - 2. Subfloor ¾ inch thick 24 inch by 96 inch sheathing factory prepared with anchor slots.
 - 3. Metal anchor channels: As engineered by manufacturer.
- D. Flooring: Nominal ¾ inch 25/32 inch) thick by 1-1/2 inches wide kiln-dried plain sawn Northern Hard Maple (*Acer Saccharum*), MFMA grade-marked, tongue and grooved, and delivered to the project in bundles bearing the specified grade marking.
 - 1. Product: Robbins "Continuous Strip XL" or approved equal.
 - 2. Grade: MFMA Second and Better Grade, Mixed Grain, TGEM, KN.

3. Individual strip length: Random lengths, ranging from a minimum of 9 inches to a maximum of 102 inches. Proportion of board lengths shall be in accordance with specified MFMA grade.
4. Floor edgings: Plain sawn solid White Hard Maple, AWI Custom Grade, of sizes and profiles indicated on the Drawings.

E. Fasteners:

1. Flooring: 1-3/5 inch (45mm) barbed cleats or equivalent.
2. Channel anchors: 1-1/4 inch (35mm) long steel power actuated or pneumatic anchors.

2.3 ACCESSORIES

A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:

1. Ardex, Inc., products: "Feather Flash" and "Ardex SD-P".
2. Bonsal American, Charlotte, NC, product: "Pro Spec – Floor Patch Pro".
3. Quikrete Companies, product: "Fast-Set Underlayment 1248".
4. Silpro Masonry Systems Inc., product: "Profinish".
5. Provide accessories from the same manufacturer as patching and filling compounds as approved by the Architect.

B. Accessories:

1. Primers: Unless otherwise recommended by cementitious underlayment and patching mortar manufacturer for substrate material, condition, and porosity encountered:
 - a. Ardex: "P-51".
 - b. Pro Spec: "Level Set Primer".
 - c. Silpro: "C 21 All Acrylic".
 - d. Cleaning agent: Commercial Muriatic acid.

C. Wall base: Vented molded rubber or powder coated extruded aluminum cover base, 4 by 3 inches with pre-molded corners as supplied by flooring manufacturer.

D. Thresholds: Extruded aluminum threshold, 5 inches wide by 1/4 inch high with fluted surface.

1. Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Hager Hinge Company, Saint Louis MO.
 - b. National Guard Products Inc., Memphis TN.
 - c. Pemko, Memphis TN.
 - d. Reese Enterprises, Inc., Rosemount MN.,
 - e. Zero International Inc., Bronx NY.

E. Sheathing protection paper: Red Rosin or Waxed kraft paper.

F. Fasteners:

1. Fasteners for underlayment: Power-actuated fasteners of appropriate size for the specific substrate.
2. Fasteners for flooring: 7d or 8d cut nails or screw-type nails, or other fasteners as recommended by the flooring manufacturer, for blind-method installation over plywood underlayment.

2.4 FINISHING

- A. Sandpaper: Number 1-1/2 graduating to 1/2; followed by Numbers 0 and 00 for final sanding, except as otherwise recommended by the flooring manufacturer.
- B. Filler: Paste wood filler, in tone as selected by the Architect.
- C. Floor finish: MFMA Group 3 Surface Finish complying with the following requirements:
1. Non-Volatile Content: 40%-60%
 2. Viscosity: A-C
 3. Flash Point: $\geq 38^{\circ}\text{C}$ (100°F)
 4. Gloss: ≥ 90
 5. Color : Shall not be darker than Gardner Color Standard, number 12
 6. Dry Film Color : Upon comparison, an oven-aged panel should not have darkened when compared to an unexposed panel.
 7. Package Stability: All Groups shall be free from sediment and suspended solid matter (Group 1 sanding sealers need not meet this requirement). All groups shall be resistant to skinning and show no color change after aging.
 8. Dry Time: Shall set to touch in not less than one hour nor more than three hours. They shall dry hard for re-coat or service in less than seven hours without developing tackiness.
 - a. Shall spread easily 15 minutes after coating.
 - b. Shall show no evidence of tackiness
 9. Hardness (Sward Hardness Rocker)- Tested seven days after applications. Must exhibit a minimum hardness of 30
 10. Abrasion Resistance –Sand Coefficient - ≥ 120 – James Machine Weight loss shall not exceed 1% - Black Heel mark Resistance – All products must have a minimum rating of excellent.
 11. Flexibility: pass the 1/8" mandrel Test. No cracking shall occur between points 1/4" inch from each side of the panel.
 12. Adhesion: provide good adhesion properties when recoated after 24 hours.
 13. Maintenance –easily removed by using conventional physical or chemical methods. Shall be capable of blending with patched worn areas.
 14. Stain Resistance – Shall show no whitening, no more than very slight dulling and no other visible defects when exposed to the following staining agents: Distilled Water, Light duty, all-purpose cleaner (Spic & Span®), 1% solution in water), Vegetable Oil.

15. Alcohol, Naphtha, Beer and Coca-Cola® Resistance – Shall show no evidence of damage, dulling or whitening by the introduction of a 50% alcohol/water solution, Naphtha, Beer and Coca-Cola®.
 16. Perspiration Resistance – Shall exhibit no discoloration or loss of adhesion by the introduction of synthetic perspiration.
 17. Coefficient of Friction – Must achieve a minimum Coefficient of Friction reading of 0.50.
- D. Painting: Provide game lines in 4 colors, to define the following:
1. Four full basketball courts.
 2. Two full volleyball courts.
 3. Main center court logo.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify concrete substrate has cured for at least 60 days. Test concrete with 3 percent solution of phenolphthalein in grain alcohol for dryness. Do not proceed with installation until substrate passes dryness test, immediately notify Architect of unacceptable substrate conditions.
- B. Verify that permanent heat, light, and ventilation is complete and operational prior to installation.
- C. Inspect all substrate surfaces and verify that they are in proper condition to receive the work of this Section.
 1. Verify that concrete substrate surfaces are smooth and flat to plus or minus 1/8 inch in 10 feet, free of scaling, oil, grease, dust, and foreign substance.
 2. Verify that wood subfloor is properly secured, is smooth and flat to plus or minus 1/8 inch in 10 feet, free of foreign substances.
- D. Verify that required flooring mounted utilities are in proper location.
- E. Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

- A. Comply with flooring manufacturer's requirements for preparation of substrate to receive wood flooring.
- B. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.
- C. Surface Preparation:
 1. Remove by mechanical means (light sanding and grinding), all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter. Do not use solvents.
 2. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.

3. Apply troweled subfloor filler and leveler to provide finished concrete surface smooth, with no more than 1/8 inch variation from plane within 10 feet in any direction.
 - a. Prohibit traffic until filler and leveler is cured.
 4. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.
- D. Apply primers as recommended by adhesive manufacturer's written instructions.
- E. Open bundles of flooring, and permit the pieces to properly acclimatize prior to installing same.
1. Condition flooring materials, accessories and adhesives to room temperatures for a period of 48 hours minimum.

3.3 INSTALLATION - GENERAL

- A. General Install in accordance with manufacturer's instructions. Arrange strips with staggered end joints and end grain, matched, set joints flush and tight.
- B. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar. Provide divider strips.
- C. Flooring System:
1. Membrane: Install polyethylene film with joints lapped and taped a minimum of 6".
 2. Install Resilient-pads to bottom of 1st layer of sub-floor in accordance with manufacturer's instructions.
 3. Install 2 layers of subfloor opposite to each other at a 45 degree angle to the flooring as recommended by the floor manufacturer.
- D. Fill voids between sleepers with specified mineral wool insulation, full depth.
- E. Flooring:
1. Wood flooring shall be laid with fine hairline joints and not driven up tightly except for low humidity regions. Provide a 2" minimum expansion void at perimeter and at vertical obstructions.

3.4 INSTALLATION - VOLLEYBALL SLEEVES

- A. Volleyball sleeves: Install volleyball system in accordance with manufacturer's instructions.
1. Coordinate installation of floor sleeves with other trades.
 2. Install floor sleeves to accommodate standards plumb and at equal height.
 3. Grout volleyball sleeves in place at concrete substrate.

3.5 SANDING AND FINISHING PREPARATION

- A. Mask off adjacent surfaces and take precautions to contain dust.
- B. Sand flooring including facings, and edgings, after installation of flooring and repairs, and after adjacent work is completed.

1. Sanding: Sand flooring with drum sander, edger, buffer and hand scraper.
 - a. Use a power sander, taking precautions to contain dust, sand flooring in several complete passes, commencing with 1-1/2 graduating to 1/2; followed by Numbers 0 and 00 for final sanding.
 - b. After sanding, buff entire floor using 100 grit screen back or equal grit sandpaper with a heavy-duty buffing machine.
 - c. Vacuum and/or tack floor before first coat of sealer.
 - d. Floor shall present a smooth surface without drum stop marks, gouges, streaks or shiners.
 - C. Sand all flooring, facings, edgings, stair treads and risers, and nosings after installation of flooring and when adjacent work is complete. Leave floor finish with no evidence of sander marks. Fill all nail holes with appropriate wood filler for blending into finish floor. Take precautions to contain dust and leave floor finish with no evidence of sander marks.
 - D. Thoroughly vacuum-clean all sanded surfaces and other finish surfaces within space, clean surfaces completely free from dust, and dry-mop with a tack cloth-clad mop.
- 3.6 FINISHING
- A. Prior to commencing application of finishing products, measure moisture content of flooring using moisture meter, and record results.
 - B. Stain wood to color and tone to match architect's accepted sample, applying stain at approximately 100 square feet per gallon; allow stain to fully dry, verify with moisture meter.
 - C. When stain has cured, apply one coat of Basic Coatings product "Hydroline sealer" as recommended by manufacturer. When that moisture content of wood is same as original prior to application, sand/buff coat with a used 120 grit screen.
 - D. Vacuum up all dust and tack with a clean water dampened towel. Apply second coat of sealer and, repeat sanding and cleaning procedures.
 - E. Permit sealer to dry overnight prior to finishing with catalyzed urethane. Re-sand and clean as required.
 - F. Mix catalyst with urethane in strict adherence to manufacturers' instructions. Apply one coat of catalyzed urethane with a coverage rate as recommended by manufacturer. When manufacturer recommends first coat should be dry, check the moisture content of wood. When moisture content is same as original prior to application, sand with used 120 grit screen, clean and apply second coat. This should occur between 3 and 5 hours after first coat. If more than 5 hours has lapsed prior to starting the second coat of urethane, repeat sanding and cleaning procedures specified above and apply second coat.
 - G. Installation of perimeter vented molding and thresholds.
 1. Install aluminum threshold or screws and anchors, plumb and at equal height.

2. Install vented cove base anchored to walls with recommended adhesive, screws, or anchors. Use pre-molded outside corners and neatly miter inside corners.

3.7 CLEANING

- A. Daily clean work areas by sweeping and disposing of scraps and sawdust.
- B. As work progresses, remove excess adhesive from floor, base and wall surfaces without damage.
- C. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- D. Clean and polish floor surfaces in accordance with manufacturer's instructions.

3.8 PROTECTION

- A. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Prohibit construction traffic for a minimum of 48 hours on completed areas of adhesive applied flooring.
- B. Cover the all wood floor surfaces, with heavyweight non-staining kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection. Remove and dispose of floor protection as directed by Construction Manager.

End of Section

Section 09 65 13
RESILIENT BASE AND ACCESSORIES
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 06)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 06.

1.2 SUMMARY

- A. Preparation of substrate.
- B. Furnish and install the following:
 - 1. Coved resilient base at resilient flooring.
 - 2. Straight resilient base at carpeted areas.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: application of protection paper to finished resilient flooring.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.

- F. Section 09 00 06 - RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- G. Section 09 65 43 - LINOLEUM FLOORING: Linoleum sheet flooring.
- H. Section 09 68 13 - TILE CARPETING: Carpet tile and transition strips.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. F1861 - Standard Specification for Resilient Wall Base.
 - 3. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.5 REGULATORY REQUIREMENTS

- A. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of base trim in accordance with ASTM E 84.

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
- B. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
 - 2. Selection samples: Manufacturers' sample chain of colors available for selection by Architect.
 - 3. Verification samples: Each type resilient base and color selected, 24 inches long.
 - 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General

Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.7 QUALITY ASSURANCE

- A. Avoid color and pattern differential; provide base from one production run in any single room or contiguous areas.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver resilient base materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.
- B. Store materials in a clean dry, enclosed space off the ground and protected from the weather. Protect adhesives from freezing.

1.9 ENVIRONMENTAL CONDITIONS

- A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work.

- B. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
- C. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.11 WARRANTY

- A. Under the provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, provide manufacturer's standard wear warranties for all resilient base materials installed under this Section.

1.12 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, deliver to the Owner extra base materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.
 - 1. Resilient base: 100 linear feet of each type and color installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Johnsonite, Middlefield OH.
 - 2. Burke-Mercer Products Company, San Jose CA.
 - 3. Roppe Corporation, Fostoria OH.
 - 4. Vinyl Products Inc., Floor Products Division, Sheboygan WI.
 - 5. Tarkett, Inc., Parsippany NJ.

2.2 RESILIENT BASE

- A. Rubber Base: 4 inches and 6 inches high, ribbed back, 1/8 inch thick, rounded top complying with ASTM F-1861, Type TP, Thermoplastic Rubber (TBR). Colors shall be as selected. Rubber base shall be furnished in continuous lengths, approximately 100 feet long.
 - 1. Provide coved base at resilient flooring.
 - 2. Provide straight (un-coved) base at carpeted and walk-off entrance mat areas.
 - 3. Scribe 6 inch high base to fit all corridors and other areas to receive wall tile.
- B. Base accessories: Premolded end stops of same material, size and color as base. Job-form all external and internal corners from base material, pre-molded corner pieces will not be acceptable

2.3 ACCESSORIES

- A. Adhesives

1. General: Water resistant, low VOC, acceptable to the resilient flooring manufacturer, for substrate conditions.
2. Acceptable products include the following, or approved equal:
 - a. Advanced Adhesive Technology, Inc, Dalton GA, product: "No. 432 Modified Acrylic Cove Base Adhesive".
 - b. DAP Incorporated, Dayton OH, product: "Cove Base Construction Adhesive".
 - c. Roberts Consolidated Industries, Inc., City of Industry, CA, product: "Premium Solvent-Free Cove Base Adhesive".
- B. Joint sealer for between the top of wall base and irregular wall surfaces: Plastic filler as recommended by manufacturer.
- C. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 INSTALLATION - GENERAL

- A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
- B. Spread only enough adhesive to permit installation of materials before initial set.

3.3 INSTALLATION OF ACCESSORIES

- A. Resilient base: Install base on solid backing, bond to vertical substrate with continuous contact at horizontal and vertical surfaces. Apply wall base to walls, columns, casework and other permanent fixtures in areas where base is required.
 1. Install in lengths as long as practical.
 2. Scribe to fit to door frames and other interruptions.
 3. Form all external and internal corners in accordance with manufacturer's written instructions. Cope inside corners and fit neatly.
 4. Fill voids with plastic filler along the top edge of the resilient wall base on masonry surfaces or other similar irregular substrates.

3.4 CLEANING

- A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
- B. Post-installation Cleaning: As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.

End of Section

Section 09 65 23
RUBBER FLOORING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 06)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 06.

1.2 SUMMARY

- A. Prepare substrates to receive rubber flooring as required to ensure specified tolerance level for finish surface of flooring. Preparation work includes patching, smoothing and leveling substrate, including:
1. Grinding down high spots of substrate.
 2. Providing Portland cement-based latex underlayment (filler).
- B. Furnish and install the following:
1. Hammered surface rubber flooring tile.
 2. Hammered sheet rubber stair treads/risers.
 3. Hammered rubber flooring tile at stair landings.
 4. Rubber base.
 5. Transition strips wherever edges of resilient rubber flooring materials abut dissimilar flooring, where no thresholds occur.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- G. Section 09 05 63 – MOISTURE VAPOR EMISSION CONTROL: Moisture mitigation of concrete slabs.
- H. Section 09 65 43 - LINOLEUM FLOORING: Linoleum sheet flooring.
- I. Division 26 - ELECTRICAL: In-floor electrical receptacles.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. ASTM F-1344 - Specification for rubber floor tile.
 - 3. ASTM F-710 - Preparing Concrete Floors to Receive Resilient Flooring.
 - 4. ASTM F-1869 – Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 5. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.5 REGULATORY REQUIREMENTS

- A. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring in accordance with ASTM E 84.
- B. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:
 - 1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.
 - 2. ASTM E 662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Furnish manufacturer's product literature on flooring adhesive, highlight adhesive properties, including VOC's and maximum moisture pressure limits for substrates.
2. Submit the manufacturer's certification that the resilient flooring has been tested by an independent laboratory and complies with the required fire tests.
3. Shop drawings: Plans, in scale to match Contract Drawings, of each flooring area scheduled for Work of this Section; indicate layout of tile units and direction of tile patterns, identify selected colors and patterns.
4. Selection samples:
 - a. Manufacturers' sample chain of colors and patterns available for selection by Architect.
5. Verification samples:
 - a. Full sized flooring tile, illustrating color, and pattern for each type of tile selected.
 - b. Sheet flooring: 12 by 12 inch illustrating color, and pattern for each color and type of flooring selected.
 - c. Edging: 12 inches long demonstrating profile, thickness, size and color.
6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.

- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
 - B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Maintenance data: Include maintenance procedures, recommended maintenance materials, a suggested schedule for cleaning, stain removal methods, and polishing.
- 1.7 QUALITY ASSURANCE
 - A. Manufacturer: Provide resilient flooring manufactured by a firm with a minimum of 10 years experience in the fabrication of resilient flooring of types equivalent to those specified.
 - 1. Manufacturer capable of providing field service representation.
 - B. Installer's Qualifications: Installer experienced (minimum of 2 years) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.
 - C. Materials: For each type of material required for the work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturer of the primary materials. Comply with applicable regulations regarding VOC (volatile organic compound) content of adhesives.
 - D. Color Matching: Provide resilient flooring products, including accessories, from one manufacturer to ensure color matching.
 - 1. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.
- 1.8 DELIVERY, STORAGE AND HANDLING
 - A. Deliver resilient flooring materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.
 - B. Store materials in a clean dry, enclosed space off the ground and protected from the weather. Protect adhesives from freezing.
- 1.9 ENVIRONMENTAL CONDITIONS
 - A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 48 hours prior to, during, and 48 hours after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 48 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work.
- B. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated and work overhead is completed.
- C. Install flooring after interior wet work is dry.

1.11 WARRANTY

- A. Under the provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, provide manufacturer's standard wear warranties for all flooring and stair tread materials installed under this Section.

1.12 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts:
 - 1. Rubber tile: 5 percent of each material in each color, and pattern installed.
 - 2. Furnish a quantity of adhesive of each type used in sealed cans or containers sufficient to apply the above materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Freudenberg Building Systems Inc. (Nora Systems, Inc.), Salem, NH.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Freudenberg Building Systems Inc., (Nora Systems, Inc.) Salem, NH.
 - 2. Roppe Corporation, Fostoria OH.
 - 3. Burke-Mercer Products Company, Orlando FL.

2.2 TEXTURED SURFACE RUBBER FLOORING TILE

- A. Rubber flooring tile: Hammered surface, 3.5mm (0.14 inches) overall thickness.
 - 1. Acceptable Products:
 - a. Freudenberg Building Systems Inc., (Nora Systems, Inc.) Salem, NH., product: Norament Grano, Article 1880 or approved equal. Tile size: nominal 39-3/8 inches by 39-3/8 inches square (actual 100cm by 100cm).
 - b. Roppe Corporation, product, "Fiesta No. 993 Textured". Tile size: nominal 19-11/16 inches by 19-11/16 inches square (actual 50cm by 50cm)

- c. Burke Flooring, product, "Endura Flecksibles Sculptured". Tile size: nominal 36 inches by 36 inches square (actual 91.4cm by 91.4cm)
2. Material: Natural fillers and environmentally compatible color pigments.
3. Back of tile: Smooth, doubled sanded back
4. Warranty: 10 years.
5. Abrasion Resistance: Taber abrasion test, ASTM D 3389, H-18 wheel, 500 gram load, 1000 cycles, gram weight loss not greater than .60
6. Hardness: ASTM D 2240, Shore A, not less than 85
7. Slip Resistance: Static coefficient of friction (James Test), ASTM 2047, equal to or greater than 0.5
8. Flammability: ASTM E 648; NFPA 253; NBS smoke density, less than 450
9. Burn Resistance: Cigarette and solder burn resistance
10. Halogen Free: Products shall contain no halogens
11. Asbestos-Free: Products shall contain no asbestos
12. Color: 1 main color and 2 accent colors from manufacturers full range of color selections.

2.3 RUBBER STAIR TREADS/RISERS AND LANDINGS

- A. Floor and stair treads: One piece nosing-tread-riser combination for stair width or approved equal. Hammered surface, fleck multi-color design, 5.0 mm (0.20 inches) overall thickness with smooth double-sanded back. Fabricate flooring from synthetic rubber free from reground rubber, natural rubber or coarse fillers, having no asbestos, halogens or polyvinyl chloride (PVC). Tread / riser combination system shall have integral contrasting color inserts.
 1. Wear Warranty: 10 year limited warranty.
 2. Standard: ASTM F 1344, for solid color homogeneous tiles and through-mottled tiles as applicable.
 3. Abrasion Resistance: Taber abrasion test, ASTM D 3389, H-18 wheel, 500 gram load, 1000 cycles, gram weight loss not greater than < 0.60.
 4. Hardness: ASTM D 2240, Shore A, not less than > 75.
 5. Slip Resistance: Static coefficient of friction (James Test), ASTM D 2047, equal to or greater than 0.8, ADA guidelines compliance.
 6. Flammability: ASTM E 648; NFPA 253; NBSIR 75 950 result to be not less than > 0.45 watts per square centimeter, Class 1.
 7. Smoke Density: ASTM E 662, NFPA 258, NBS smoke density, less than < 450.
 8. Bacteria Resistance: Products shall be resistant to bacteria, fungi, and micro-organism activity, according to ASTM E 2180 and ASTM G 21.
 9. Color: As selected from manufacturer's full range. Provide contrasting nosing inserts as selected by the Architect.

2.4 RUBBER BASE

- A. Rubber Base: Synthetic rubber straight base, nominally 4 inches high and 0.11 inch thick; equal to Freudenberg Building Systems Inc., (Nora Systems, Inc.)

Salem, NH., product "Nora - S1026U". Colors shall be as selected by the Architect from manufacturer's full library of colors available.

1. Base accessories: Premolded end stops of same material, size and color as base. Job-form all external and internal corners from base material, pre-molded corner pieces will not be acceptable

2.5 ACCESSORIES

- A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
 1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
 2. Quikrete Companies, product "Fast-Set Underlayment 1248".
 3. Silpro Masonry Systems Inc., product "Profinish".
- B. Adhesives and primers: Water resistant, acceptable by the resilient flooring manufacturer.
- C. Transition strips: Homogeneous vinyl, of profiles required for thickness of abutting materials, in colors as selected by the Architect.
- D. Cleaning material: Domestic floor detergent, as recommended by the flooring manufacturer.
- E. For sealing joints between the top of wall base and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.
- F. Provide transition/reducing strips, tapered to meet abutting materials.
- G. Provide threshold of thickness and width as shown on the drawings.
- H. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, rubber composition, tapered or bull nose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Insure that concrete substrate is acceptable to the flooring manufacturer and adhesive supplier. Conform to requirements of Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS.
- C. Preinstallation Testing, Evaluation and Assessment: Moisture testing of concrete substrate, refer to Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS.

- D. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. General: Comply with requirements specified under Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS, the flooring manufacturer's requirements for preparation of substrate to receive resilient flooring, and as additionally specified herein.
- B. Pre-installation off-gassing ventilation: Ventilate flooring products prior to installation. Open packaging, or remove from packaging, and ventilate flooring in a secure, dry, well-ventilated space free from contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for not less than 72 hours.
 - 1. Do not ventilate within limits of Work unless otherwise approved by Architect.

3.3 INSTALLATION - GENERAL

- A. General: Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
- B. Install resilient flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.
- C. Spread only enough adhesive to permit installation of materials before initial set.

3.4 INSTALLATION - FLOOR TILE

- A. Lay flooring in a square grid pattern, with joints and seams parallel to building lines. Lay tile with joints straight and continuous in both directions and with border tile not less than 1/2 the width of the tile.
- B. Lay resilient flooring with arrows in the same direction.
- C. Neatly fit resilient materials to all intersecting surfaces, and make joints as inconspicuous as possible.
- D. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color.
- E. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.
- F. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.
- G. Install reducer strips at exposed edges.

3.5 INSTALLATION OF TREADS AND RISERS

- A. Begin installation at bottom step and continue upwards towards each landing. Cut riser part of the step-tread to fit to the riser of the step below. Trim even with the edge of the riser.
- B. Cut and dry fit treads and risers before installation.
- C. Apply contact adhesive to the substrate and back of the step-tread. Permit contact adhesive to dry to touch.
 - 1. Apply adhesives to steps and risers.
- D. Install tread-riser combination units as recommended by manufacturer using manufacturers removable slip sheet or wax paper to locate step tread before adhering in place.
 - 1. Fit nosing material tight to the nosing of the stair.
- E. Use roller or stair tool to press stair materials into place. Remove excess adhesive.
- F. After installation check adhesive bond to treads and risers.

3.6 INSTALLATION OF ACCESSORIES

- A. Resilient edge and transition strips:
 - 1. Install edge strips at all edges of flooring which would otherwise be exposed.
 - 2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.7 PROTECTION

- A. Prohibit all traffic on finished floor areas for a minimum period of 12 hours.
- B. Protect finished floor areas from sun and moisture and construction traffic for a minimum period of 2 calendar days after installation.
- C. Prohibit washing, scrubbing or other similar 'wet' operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.
- D. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all resilient floor surfaces with heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection. Remove and dispose of floor protection as directed by Construction Manager.

3.8 CLEANING

- A. General: Comply with requirements of Section 01 73 00 – EXECUTION for periodic and final cleaning, and as additionally specified herein. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
 - 1. Control accumulation of waste materials and trash. Daily clean work areas by sweeping and disposing of debris, and scraps.

- B. As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.
 - 1. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- C. Sweep floors to remove all loose dirt and debris.
- D. Not sooner than five days after installation, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.
- E. After cleaning and polishing, ensure that the flooring is protected with heavy kraft paper.

End of Section

Section 09 65 43
LINOLEUM FLOORING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 06)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 06.

1.2 SUMMARY

- A. Furnish and install the following:
1. Linoleum sheet and modular tile flooring.
 2. Vinyl transition strips wherever edges of linoleum flooring materials abut dissimilar flooring, where no thresholds occur.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.

- F. Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- G. Section 09 05 63 – MOISTURE VAPOR EMISSION CONTROL: Moisture mitigation of concrete slabs.
- H. Section 09 29 00 - GYPSUM BOARD: Gypsum board substrate to receive resilient base.
- I. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Covered resilient base in conjunction with resilient flooring.
- J. Section 09 65 19 - RESILIENT TILE FLOORING: Vinyl composition tile flooring at classrooms and corridors.
- K. Section 09 65 23 - RUBBER FLOORING: Rubber tile and sheet flooring, rubber stair treads and risers.
- L. Section 09 68 13 – TILE CARPETING: Carpet tile and transition strips.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials
 - 2. ASTM E 492 – Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine
 - 3. ASTM E 648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
 - 4. ASTM E 662 – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - 5. ASTM E 989 – Standard Classification for Determination of Impact Insulation Class (IIC)
 - 6. ASTM E 1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
 - 7. ASTM F 141 – Standard Terminology Relating to Resilient Floor Coverings
 - 8. ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
 - 9. ASTM F 1482 – Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
 - 10. ASTM F 1861 – Standard Specification for Resilient Wall Base
 - 11. ASTM F 1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - 12. ASTM F 2034 – Standard Specification for Linoleum Sheet Floor Covering

13. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
14. ASTM F-2195 –Linoleum Floor Tile
15. ASTM F 2419 – Standard Practice for Installation of Thick Poured Gypsum Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring
16. ASTM F 2471 – Standard Practice for Installation of Thick Poured Lightweight Cellular Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring
17. ASTM F 2659 – Standard Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and other Floor Slabs and Screeds Using a Non- Destructive Electronic Moisture Meter
18. ASTM F 2678 – Standard Practice for Preparing Panel Underlayments, Thick Poured Gypsum Concrete Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring
19. ASTM F 3191 – Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring
20. NFPA 253 – Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
21. NFPA 258 – Test Method for Specific Optical Density of Smoke Generated by Solid Materials
22. NFPA 253 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
23. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 09 00 06 – RESILIENT FLOORING FILED SUB-BID REQUIREMENTS.
- B. Sequencing:
 1. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
 2. Ensure that installation of flooring and accessories occurs after other finishing operations, including painting.

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each specified product.

- a. Furnish manufacturer's product literature on flooring adhesive, highlight adhesive properties, including VOC's and maximum moisture pressure limits for substrates.
2. Shop drawings: Plans, in scale to match Contract Drawings, of each flooring area scheduled for Work of this Section.
 - a. Indicate layout of tile units and direction of tile patterns.
 - b. Identify selected colors and patterns.
 - c. Show location of welded seams and joints with abutting materials.
 - d. Drawings shall bear dimensions of actual measurements taken at the project.
 - e. Show locations and types of reducer and edge strips.
 - f. Where more than one adhesive type is specified or otherwise required by flooring manufacturer, identify on shop drawings areas for each adhesive type.
3. Samples for selection: Manufacturers' sample chain of colors and patterns available for selection by Architect.
4. Verification Samples:
 - a. Sheet flooring: 12 by 12 inch illustrating color, and pattern for each color and type of flooring selected.
 - b. Full sized flooring tile, illustrating color, and pattern for each color and type of tile selected.
 - c. Resilient base: Each type and color selected, 24 inches long.
 - d. Edging: 12 inches long demonstrating profile, thickness, size and color.
5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.

- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.7 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Provide installed mock-up of flooring, minimum 100 square feet, illustrating color, texture and finish for each flooring type specified herein, and demonstrating the minimum standard for the Work.
- C. Locate mock-ups where directed and include all surfaces and materials scheduled to receive a field applied finish.
- D. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
- E. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver resilient flooring materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets. Store materials in a clean dry, enclosed space off the ground and protected from the weather
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - 3. Protect adhesives from freezing.
- C. Packaging Waste Management: Comply with packaging requirements specified under Section 01 60 00 - PRODUCT REQUIREMENTS.

1. Shipping materials: Manufacturer shall utilize to the greatest extent possible packaging materials which are biodegradable and recyclable.
2. Jobsite packaging waste management: Recycle packaging materials coordinated with general construction waste management specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.9 ENVIRONMENTAL CONDITIONS

- A. Maintain uniform temperature of minimum of 65 degrees Fahrenheit and humidity of 20 to 40 percent 72 hours prior to, during, and after installation. Store resilient flooring materials and accessories in the spaces where they will be installed for at least 72 hours before beginning installation. Thereafter, maintain a minimum temperature of 55 degrees Fahrenheit in the areas where the work is completed.

1.10 SEQUENCING AND SCHEDULING

- A. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated and work overhead is completed.
- B. Install flooring and base after interior wet work is dry.

1.11 WARRANTY

- A. Submit manufacturer's standard wear warranties for all flooring materials installed under this Section under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1.12 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, deliver to the Owner extra flooring and base materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts:
 1. Flooring: 5 percent of each material in each color, and pattern installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Linoleum Flooring:
 - a. Forbo Industries Inc., Hazleton PA.
 - b. Armstrong World Industries, Inc., Flooring Division, Lancaster PA
 - c. Johnsonite Inc., Chagrin Falls OH.

2.2 DESCRIPTION

- A. Regulatory Requirements:
 1. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring in accordance with ASTM E 84.

2. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:
 - a. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.
 - b. ASTM E 662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.

B. Sustainability Requirements:

1. Biobased Material: Consisting of oxidized linseed or other vegetable drying oil and rosin, mixed with ground cork or wood flour, mineral filler, and natural pigments. Mixture shall be bonded and keyed to a burlap (jute) or other suitable fibrous backing so that backing is partially embedded in mixture.
2. Product shall be completely biodegradable.

2.3 LINOLEUM SHEET FLOORING

- A. Sheet linoleum Flooring: Marbleized sheet linoleum; all natural resilient, self-sanitizing, bactericidal inhibiting effect flooring material. Products which may be incorporated in the work include the following:
 1. Forbo Industries Inc., Hazleton PA, product: "Marmoleum Real and Vivace with Topshield".
 2. Armstrong World Industries, Lancaster PA, product: "Marmorette" and "Colorette".
 3. Johnsonite, Chagrin Falls OH, product: "Harmonium xf Linoleum".
- B. Flooring Construction: All natural materials consisting of linseed oil, cork, wood floor, resin binders, gum and dry pigments, mixed and calendared onto a natural jute backing. Total construction shall conform with FS LLL-F-1238A, and contain no asbestos.
- C. Linoleum Sheet flooring Physical Characteristics
 1. Finish: Equal to Forbo, product "Topshield2".
 2. Sheet width: 200 cm (6'-7").
 3. Gage: 2.5 mm (1/10 inch).
 4. Backing: Jute.
- D. Pattern and color shall extend throughout total thickness of wear surface. Color and patterns are as indicated on Drawings, where not indicated, as selected by Architect from manufacturer's full available range.

2.4 LINOLEUM TILE FLOORING

- A. Linoleum tile flooring: Marbleized linoleum, all natural resilient, self-sanitizing, bactericidal flooring of primarily natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendared onto a polyester backing. Total construction non-asbestos. Pattern and color shall extend throughout total thickness of wear surface. Products which may be incorporated in the work include the following:
 1. Forbo Industries Inc., Hazleton PA, product "Marmoleum Modular" in style(s) as selected by Architect.

2. Johnsonite Inc., Chagrin Falls OH, product "Harmonium xf Veneto" in style(s) as selected by Architect.
- B. Linoleum Tile Physical Characteristics
1. Size: nominal 10 by 40 inches (25 cm x 100 cm).
 2. Gauge: 1/10 inch (2.5 mm).
 3. Backing: Polyester backing.
- C. Color and patterns as indicated on Drawings, where not indicated, as selected by Architect from full available range.

2.5 ACCESSORIES

- A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
 2. Quikrete Companies, product "Fast-Set Underlayment 1248".
 3. Silpro Masonry Systems Inc., product "Profinish".
 4. Henry: product 482 Lino-Pro.
- B. Adhesive for linoleum flooring:
1. Forbo: product "Sustain 1299" or approved equal up to 99% relative humidity.
- C. Cove sticks for flashed cove installation: Non-staining, hard, rigid material with minimum 7/8 inch radius as recommended by manufacturer.
- D. Transition/reducing strips, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bull nose edge, with color to match or contrast with the flooring, or as selected by the Architect.
- E. Floor Cleaning material: Domestic floor detergent, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Insure that concrete substrate is acceptable to the flooring manufacturer and adhesive supplier. Conform to requirements of Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS.
- C. Preinstallation Testing, Evaluation and Assessment: Moisture testing of concrete substrate, refer to Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS.
- D. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. General: Comply with requirements specified under Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS, the flooring manufacturer's requirements for preparation of substrate to receive resilient flooring, and as additionally specified herein.
- B. Pre-installation off-gassing ventilation: Ventilate flooring products prior to installation. Open packaging, or remove from packaging, and ventilate flooring in a secure, dry, well-ventilated space free from contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for not less than 72 hours.
 - 1. Do not ventilate within limits of Work unless otherwise approved by Architect.

3.3 INSTALLATION - GENERAL

- A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.
 - 1. Apply primers as recommended by adhesive manufacturer's written instructions.
- B. Spread only enough adhesive to permit installation of materials before initial set.
- C. Mix tile to ensure that concentration of surface patterns is uniform throughout. Use tile from cartons in same sequence as manufactured and packaged, if so numbered.
- D. Maintain reference markers, holes and openings that are in place or have been marked for future cutting; repeat markers on flooring as marked on substrate. Use non-permanent marking devices which may be cleaning washed off when no longer required.
- E. Install resilient flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.
- F. Neatly fit resilient materials to all intersecting surfaces, and make joints as inconspicuous as possible.
- G. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color.
- H. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.
- I. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.

- J. Install reducer strips as required to terminate flooring. Transition strips with carpet are provided under Section 09 68 13.
- K. Provide adhesion testing of the flooring in accordance with the manufacturer's printed literature.

3.4 INSTALLATION - FLOOR TILE

- A. Lay flooring in a square grid pattern, with joints and seams parallel to building lines. Lay tile flooring in pattern as indicated on the drawings or if not indicated as such, lay pattern-grain in singular direction. Lay tile with joints straight and continuous in both directions and with border tile not less than 1/2 the width of the tile.
- B. Neatly fit resilient materials to all intersecting surfaces, and make joints as inconspicuous as possible.
- C. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color. Where flooring pattern continues through door openings, continue established pattern with no interruption.
- D. Apply resilient materials to have uniform contact with receiving surfaces throughout, with tight joints, and with all finish surfaces smooth, in true plane, free from buckles, waves, and other imperfections.
- E. Extend resilient flooring to wall lines beneath all movable equipment and movable casework. Fit resilient flooring onto breaks and recesses, against non-resilient bases, around pipes and other protrusions, under saddles, and to and around other fixed surfaces, making neat cuts in the flooring and minimizing joints.

3.5 INSTALLATION - SHEET LINOLEUM FLOORING

- A. Install linoleum using conventional full-spread method. Application shall be performed by factory trained mechanics franchised by the manufacturer in accordance with the manufacturer's instructions, and using tools and techniques recommended by the flooring manufacturer. Do not reverse roll sheets.
- B. Cut sheet material into required lengths and sizes. Layout and cut to achieve minimum number of seams and for pattern match between abutting edges, Reverse every other sheet.
- C. Lay cut sheets flat and allow to come to room temperature prior to installation. Seams in corridors shall run perpendicular to corridor.
- D. Lay flooring so as to ensure full uniform contact with adhesive and substrate and to produce finished surfaces which are smooth, even and in true planes, free of buckles, waves, and other imperfections.
 - 1. Wet install flooring with adhesive. Adhesive spread rate shall be as recommended by manufacturer, at approximately 125 to 175 square feet per gallon.
- E. Install the sheets and roll the floor surface to work wrinkles and air pockets out past the outer edges.
- F. Seams:

1. Sheet products shall be installed net fit seams. Install seams with no gaps or fullness, cut material at an angle so as to slightly undercut flooring, roll seam with a steel roller making sure flooring material is set in wet adhesive.

G. Flash cove installation:

1. Where indicated install cove sticks and extend flooring up the wall in a flash cove method to height indicated on Drawings.

3.6 INSTALLATION OF ACCESSORIES

- A. Place resilient transition strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring which would otherwise be exposed.
- B. Resilient edge and transition strips:
1. Install edge strips at all edges of flooring which would otherwise be exposed.
 2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

3.7 CLEANING

- A. General: Comply with requirements of Section 01 73 00 – EXECUTION for periodic and final cleaning, and as additionally specified herein. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.
1. Control accumulation of waste materials and trash. Daily clean work areas by sweeping and disposing of debris, and scraps.
- B. As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.
1. Prohibit traffic on finished floor areas until flooring adhesive has fully set.
 2. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- C. Sweep floors to remove all loose dirt and debris.
- D. Clean sheet linoleum floors:
1. Scrub floors using a one disc scrubbing machine with green nylon pad and water to which a neutral cleaning agent (less than pH9) has been added.
 2. Rinse thoroughly and let dry
 3. Apply manufacturer's recommended spray cleaning fluid containing 5 percent natural wax and no polymers. Dust wipe or dry mop.

3.8 PROTECTION

- A. General: Protect finished work under provisions Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS.
- B. Prohibit traffic on finished floor areas until flooring adhesive has fully set.

- C. Prohibit washing, scrubbing or other similar 'wet' operations to occur on finished floor areas for a minimum period of 5 calendar days after installation.

- D. Provide protection of completed flooring areas from construction traffic until Substantial Completion. After cleaning and polishing, cover all resilient floor surfaces with non-staining heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection. Remove and dispose of floor protection as directed by Construction Manager.

End of Section

Section 09 65 66
RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Preparation of and leveling of substrate.
- B. Furnish and install the following:
 - 1. Polyurethane athletic flooring over polyurethane/rubber granulate base mat including adhesives, base mat, polyurethane sealer, polyurethane resin, surface finish, and game lines.
 - 2. Transition strips wherever edges of flooring materials abut dissimilar flooring, where no thresholds occur.

1.2 RELATED SECTIONS

- A. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedure requirements related to LEED for Schools v.4 Green Building Rating System, of the US Green Building Council.
- E. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete substrate for resilient flooring, and concrete sealers.
- F. Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING: General preparation and testing requirements of flooring substrate.
- G. Section 09 05 63 – MOISTURE VAPOR EMISSION CONTROL: Moisture mitigation of concrete slabs.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.
 - 3. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 2. Samples for selection: Manufacturers' sample chain of colors and patterns available for selection by Architect.
 3. Verification Samples: Full sized flooring tile, illustrating color of tile selected
 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver resilient flooring and base materials in original, unopened packages and store protected for three days prior to installation in area of installation to achieve temperature stability.

1.6 SEQUENCING AND SCHEDULING

- A. Do not install floor system until concrete has been cured sixty (60) days.
- B. Coordinate the work of this Section with the respective trades responsible for installing interfacing work.
- C. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated and work overhead is completed.
- D. Install flooring after interior wet work is dry.

1.7 WARRANTY

- A. Under the provisions of Section 01 77 00 - CLOSEOUT PROCEDURES, provide manufacturer's standard wear warranties for all flooring materials installed under this Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer Floor Type 1 (Gymnasium and Wellness): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Connor Sports Flooring Corporation, Arlington Heights IL, product, "ElastiPlus 9+2".
- B. Specified Manufacturer Floor Type 2 (Corridors): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Connor Sports Flooring Corporation, Arlington Heights IL, product, "Rinkside".
- C. Specified Manufacturer Floor Type 3 (Weight Room): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Connor Sports Flooring Corporation, Arlington Heights IL, product, "PowerDekFleck".
- D. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Connor Sports Flooring Corporation, Arlington Heights IL.
 - 2. Robbins Sports Surfaces, Cincinnati, OH.
 - 3. Mondo America, Inc., Conshohocken, PA

2.2 ATHLETIC FLOORING

- A. Athletic Flooring Type 1: All polyurethane components shall be non-hazardous, and shall not contain any lead, mercury, heavy metals, PCB, or formaldehyde, and shall be supplied by a single manufacturer.
 - 1. Physical Properties:
 - a. Thickness: 2 mm
 - b. Surface Hardness: 81 Shore A
 - c. Gloss: 5-15
 - d. Coating: Water-based top coats and game lines
 - e. Shock absorption (9mm basemat): 32.0%
 - f. Coefficient of Friction: 0.56 Dry/.28 Wet
 - g. Ball rebound: 98%
 - h. Tabor Abrasion: 0.06
 - i. Compression set: 1.9%
 - j. Impact resistance: 11 Nm
 - k. Residual Impression: 0.32mm
 - l. Resistance to rolling loads: 1500 N
 - m. Static Load Limit: 225 psi
 - n. Tensile strength: 3071 psi (21 N/mm²)
 - o. Elongation at break: 200%
 - p. Tear strength: 294 pli (51 N/mm)

2. Basemat: Specially formulated prefabricated resilient basemat made of recycled rubber and foam granules bound with MDI polyurethane. Basemat is a constant thickness.
 - a. Basemat density: 42lbs/ft³
 - b. Basemat standard thickness: 9mm
 - c. Scratch Coat (mat sealer): Two-component, thixotropic polyurethane compound.
 - d. Wear Coat: Two-component, pigmented, seamless self-leveling polyurethane; total wear layer thickness 2mm throughout the floor.
 - e. Top Coat (matte finish): Three-component water-based urethane top coat. Selected by Architect from full range of manufacturer's standard and optional colors.

 - B. Athletic Flooring Type 2: Prefabricated rubber athletic flooring, 8 mm thick, manufactured in two vulcanized layers with a base of natural and synthetic rubber, stabilizing agents and pigmentation supplied by a single manufacturer.
 1. Physical Properties:

a. Hardness Shore A	80/66
b. Water Absorption	0.13
c. Tensile Strength (kgf/cm ²)	650
d. Ultimate Elongation	200
e. Modulus 20%	175
f. Tear Abrasion	126 (H22 Wheels; 1 Kg Load)
g. Tear Resistance	161
h. Dimensional Stability	+0,02
i. Density of Smoke	.411 (flaming)
j. Critical Radiant Flux	0.49 / 1
k. Compression Set (70°C, 22h)(%)	84
l. Friction Test	1.03 (Dry) & 1.1 (Wet)
m. Fire Resistance	Class 1, Inflammable
n. Static Load Limit (250 psi, 24h) (mm)	0.40

 - C. Athletic Flooring Type 3: 10 mm thick. All polyurethane components shall be non-hazardous, and shall not contain any lead, mercury, heavy metals, PCB, or formaldehyde, and shall be supplied by a single manufacturer.
 1. Physical Properties:

a. Hardness Shore A	82/75
b. Water Absorption	0.13
c. Tensile Strength (kgf/cm ²)	650
d. Ultimate Elongation	200
e. Modulus 20%	175
f. Tear Abrasion	126 (H22 Wheels; 1 Kg Load)
g. Tear Resistance	161
-

- h. Dimensional Stability +0,02
- i. Density of Smoke 411 (flaming)
- j. Critical Radiant Flux 0.49 / 1
- k. Compression Set (70°C, 22h)(%) 84
- l. Friction Test .99 (Dry) & 1.1 (Wet)
- m. Fire Resistance Class 1, Inflammable
- n. Static Load Limit (250 psi, 24h) (mm) 0.16

D. Game Line Paint: Three-component water-based urethane. Selected by Architect from full range of manufacturer's standard and optional colors.

- 1. Painting: Provide game lines in 2 colors, to define the following:
 - a. One full basketball court.
 - b. One full volleyball court.

2.3 ACCESSORIES

A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:

- 1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
- 2. Quikrete Companies, product "Fast-Set Underlayment 1248".
- 3. Silpro Masonry Systems Inc., product "Ultra Skim and Speedtop"

B. General Flooring Adhesives: Two component polyurethane adhesive as recommended by the manufacturer, VOC compliant, capable of withstanding the following in continuous service:

- 1. Up to 95% relative humidity (RH) when measured in accordance with ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes.
- 2. Up to 8 lbs./1,000 sq. ft./ 24 hours MVER when measured in accordance with ASTM F1869 - Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- 3. VOC content: Less than 50 g/L.

C. Transition strips: As recommended by the manufacturer.

D. Cleaning material: Floor detergent, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of substrate and site conditions.

3.2 PREPARATION

- A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.
- B. Remove, by light sanding and grinding, all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, or other foreign matter.
- C. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.
- D. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.
- E. Apply primers as recommended by adhesive manufacturer's written instructions.

3.3 INSTALLATION

- A. Product should be unrolled and allowed to relax before cutting and fitting.
- B. Mix two-component epoxy (or urethane) adhesive according to manufacturers instructions. Use 1/8" notched trowel to spread adhesive.
- C. Unroll product into freshly applied adhesive. End seams will be single cut, edge seams overlapped, then snapped into place to insure tight seam.
- D. Roll the entire sport floor surface with a medium-size steel roller to remove entrapped air. Wipe away adhesive that oozes between seams with wood alcohol.
- E. All seams must be weighted in place. Leave weight in place a minimum of twelve (12) hours.
- F. Game-line painting should be in accordance with manufacturer's current procedures, using approved materials.
- G. Perimeter molding: Install a rubber base, anchored to walls with base cement.
- H. Clean up all unused materials and debris and remove same from the premises. Dispose of empty containers in accordance with federal and local statutes.

3.4 PROTECTION

- A. Prohibit traffic on finished floor areas until flooring adhesive has fully set.
- B. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all resilient floor surfaces with heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers as required to maintain floor protection. Remove and dispose of floor protection as directed by Construction Manager.

3.5 CLEANING

- A. As installation progresses, continually remove excess adhesive from floor, base and wall surfaces without damage.
- B. Not sooner than five days after installation, clean all materials installed hereunder with a non-abrasive commercial detergent approved by the material manufacturers, and thoroughly rinse with clear water.

End of Section

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Section 09 66 23
RESINOUS MATRIX TERRAZZO
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 03)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Trade Contract Requirements: As provided under Section 09 00 03 - TILE TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 03.

1.2 SUMMARY

- A. Furnish and install:
 - 1. One-piece epoxy terrazzo stair treads.
 - 2. Epoxy terrazzo 12 inch by 24 inch tile at stair landings, Lobby and elsewhere as indicated on Drawings.
 - 3. Epoxy terrazzo coved base where indicated on Drawings.
 - 4. Installation systems, adhesives, mortars and grouts.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: Application of protection paper to finished resilient flooring.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction recycling.

- D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedure requirements related to LEED for Schools v.4 Green Building Rating System, of the US Green Building Council.
- E. Section 05 50 00 – METAL FABRICATIONS: Stair construction to receive terrazzo treads and risers.
- F. Section 09 00 03 – TILE TRADE CONTRACT REQUIREMENTS: Trade Contract requirements for work of this Section.
- G. Section 09 30 13 – CERAMIC TILING
- H. Section 09 30 19 – PORCELAIN TILING

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A108.1B - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.
 - 2. ANSI A108.4 - Installation of Ceramic Tile Installed with Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
 - 3. ANSI A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
 - 4. ANSI A108.6 - Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy.
 - 5. ANSI A108.10 - Installation of Grout in Tilework.
 - 6. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable by Physically Handicapped People.
 - 7. ASTM C 150 - Portland Cement.
 - 8. ASTM D-635 – Rate of Burning an/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position.
 - 9. ASTM D-696 – Coefficient of Linear Thermal Expansion of Plastics.
 - 10. NTMA - published standards and specifications.
 - 11. United States Department of Justice, N° 28 CFR Part 36 - Americans with Disabilities Act, (Public Law 101-336).

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 - 2. Shop drawings:
 - a. 1/4 inch scale plans and sections of terrazzo stair indicating layout of tread/risers.

- b. Large scale details of tread/risers showing profiles, reinforcement and attachment hardware.
 - 3. Samples:
 - a. Two samples 12 x 12 inch in size illustrating chip size variation, color mix, and mortar color.
 - 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
 - f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
 - B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Cleaning and maintenance data. Include procedures for stain removal, stripping, sealing, and waxing.
- 1.6 QUALITY ASSURANCE
- A. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.
 - B. Manufacturer: with a minimum of 5 years verifiable experience providing materials of the type specified in this section.

- C. NTMA Standards: Comply with specified provisions and recommendations of National Terrazzo & Mosaic Association, Inc. (NTMA).
- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Store and protect containers above floor level, keep dry until ready for use.
 - B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions. Store epoxy mortar and epoxy grouts at 70 degrees Fahrenheit (21° C) temperature for 24 hours prior to use.
- 1.8 ENVIRONMENTAL CONDITIONS
- A. Do not install setting or grouting materials in a closed, unventilated environment.
 - B. Maintain ambient temperatures between 50 degrees Fahrenheit (10° C) and 95 degrees Fahrenheit (35° C) in tiled areas, for 24 hours prior to installation, during installation and for 7 days after completion.
 - C. Ventilate spaces where work of this Section occurs, during and for a period of 72 hours after completion of curing. Ventilate to dissipate humidity, and to prevent accumulation of fumes, vapors, and gases. Provide temporary fan units and ducting as required to for venting operations
- 1.9 EXTRA MATERIALS
- A. Upon completion of the Work of this Section, deliver to the Owner extra tile materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.
 - 1. Terrazzo tile: 3 percent of each material in each color, and pattern installed.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Wausau Tile, Inc., Wausau, WI,
 - 1. Precast treads: Wausau Tile E-30 precast epoxy terrazzo treads with nosing inserts 1 inch thick, honed finish.
 - 2. Tile: Wausau Tile "Tectura Terrazzo Tile" precast epoxy tiles 12 inches by 24 inches by 3/4 inch thick, honed finish.
 - B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Terrazzo tread/risers and tile:
 - a. Coverings Etc., (ECO-TERR), Miami, FL
 - b. Wausau Tile, Rothchild, WI.
 - c. Tile Tech Pavers, Los Angeles, CA.
 - 2. Setting materials:

- a. Laticrete International, Inc., Bethany CT
- b. Mapei Corporation, Elk Grove IL.

2.2 MANUFACTURED UNITS

A. Materials:

1. Portland Cement: ASTM C-150 specifications for Portland Cement.
2. Aggregates: All aggregates to meet ASTM C-33 specifications, cleaned and graded to size. Aggregate shall be blended to meet individual project requirements. Aggregates to meet ASTM C- 13 1.
3. Coloring: Pigments used shall be inorganic, resistant to alkalinity and used per manufacturer's recommendations.
4. Color Blending: Precast terrazzo has a color range in the aggregate. This can cause slight variances in overall color. Tile is to be blended at the job site from multiple pallets in numerical sequence.

B. Precast terrazzo units (including base and treads):

1. Finish: Honed as approved by the Architect.
 - a. Gloss percentage: 50 percent.
 - b. Average Static Coefficient of Friction (ASTM C 1028):
 - 1) Wet: 0.56
 - 2) Dry: 0.79
 - c. Surfaces to be uniform in appearance.
2. Colors:
 - a. Field tile, base and treads: Color to be selected from full range of Traditional, Atmosphere, River Run, Micro and Recycled Class collections. Multiple color selections will be required.
 - b. Accent tile: Custom color to match Architect's control sample.

C. Physical properties:

1. Coefficient of friction per ASTM C-1028:
 - a. Honed Dry: 0.71; Wet: 0.68.
2. Resistance to Fire: ASTM Class 0.
3. Freeze-Thaw per ASTM C-666: None (300 cycles).
4. Compressive Strength per ASTM C-170: 14,000 - 24,000 psi.
5. Modulus of Rupture per ASTM C-99: 1,550 psi.
6. Flexural Strength per ASTM C-880: 1,973 psi.
7. Water Absorption per ASTM C-97: 3.2 percent.

2.3 SETTING MATERIALS

A. Self-leveling cementitious underlayment (factory pre-mixed) with primer. Provide primer at substrate conditions as recommended by manufacturer:

1. Acceptable products include the following, or approved equal:
 - a. Mapei product: "Ultra/Plan Extreme" with primer.

- b. Laticrete product: "86 LatiLevel", with primer.
 - c. Custom Building Products "Level Quik RS" ", with primer.
 - B. Anti-fracture membrane for crack suppression and substrate crack isolation:
 - 1. Acceptable products include the following, or approved equal:
 - a. Mapei product: "Plani/Lastic".
 - b. Laticrete product "Blue 92".
 - c. Custom Building Products "Crack Buster Pro" or "Fracture Free".
 - C. Setting Mortar (Bond Coat): Medium bed trowelled, latex modified portland cement hydraulic mortar complying with performance requirements of ANSI A 118.4.
 - 1. Acceptable products include the following, or approved equal:
 - a. Mapei product: "Grani-Rapid".
 - b. Laticrete product: "254 "Platinum.
 - c. Custom Building Products " Porcelain Tile Mortar"
 - D. Grout: Acrylic modified Portland cement sanded grout conforming to ANSI 118.6.
 - 1. Acceptable products include the following, or approved equal:
 - a. Mapei product: "Ultracolor" with acrylic latex additive "Plastijoints",
 - b. Laticrete product "Laticrete 1500 Series (sanded) with admix 1776 antimicrobial.
 - c. Custom Building Products PolyBlend sanded grouts.
 - 2. Grout Colors: To be determined by Architect, based upon final selection of colors for precast terrazzo. May require a custom color if satisfactory color is not available in manufacturer's standard range.
- 2.4 ACCESSORIES
 - A. Metal edge trim: As manufactured by Schlüter Systems L.P., Plattsburgh NY. or approved equal. Extruded aluminum, mill finish, of width shown on the drawings and of required thickness to protect exposed edges of the resilient flooring. Provide units of maximum available length to minimize the number of joints.
 - B. Sealer: As recommended by terrazzo tile manufacturer, colorless, penetrating liquid type to completely seal cementitious matrix surface; not detrimental to terrazzo components.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as shown on shop drawings.
 - 1. Do not install terrazzo tile flooring until concrete slab substrate is cured (not less than 28 calendar days minimum) and determined to be acceptable to installer.
- B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 TERRAZZO TILE INSTALLATION

- A. Description: Extra-heavy service rating, medium-set tile installation with polymer modified mortar applied over self-leveling mortar bed.
- B. General: Install in accordance with ANSI A108.5, TCNA installation method number F205, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.
 - 1. System Components:
 - a. Anti-fracture membrane.
 - b. Cementitious self-leveling underlayment with primer.
 - c. Bond coat: polymer-modified hydraulic mortar.
 - d. Grout materials: Portland cement sanded grout.
- C. Install anti-fracture membrane over existing cracks and joints in substrate materials. (TCNA F125-Full).
- D. Install cementitious self-leveling underlayment primer and underlayment.
- E. Install latex/portland cement mortar bed (bond coat) to a nominal uniform thickness of 3/8 to 3/4 inch (6mm to 18mm).
- F. Install terrazzo tile ensuring mortar coverage of at least 80 percent on back of tile.
 - 1. Clean terrazzo tile tiles (backs) and remove manufacturer's residue.
 - 2. Back-butter tile to ensure mortar coverage.
- G. Grouting:
 - 1. Allow tile to fully set prior to grouting; do not grout in less than 48 hours after installation of tile.
 - 2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.
- H. Clean terrazzo flooring and apply terrazzo tile sealer as recommended by tile manufacturer, after grout has fully cured, but not less than 72 hours after application of grout.

3.3 CLEANING

- A. Clean and polish floor terrazzo tile in accordance with the manufacturer's written recommendations, immediately prior to Substantial Completion.

3.4 PROTECTION

- A. Floors: Protect floors from foot traffic for at least 24 hours, and 72 hours for general traffic, after completion of installation (including grouting, cleaning and sealing).
 - 1. Prohibit heavy traffic on floors for at least 7 days after installation.

End of Section

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Section 09 67 23
RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Prepare surfaces to receive resinous flooring.
- B. Apply multilayered resinous waterproof flooring system with an integral waterproof base turned up at walls, bases, pipe sleeves and equipment pads.
 - 1. Provide subsequent flooring system touch-up and repairs as required to provide a complete seamless molded waterproof system.
- C. All floors and bases labeled as "epoxy" on the room finish schedule shall be coated per the requirements of this Section.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete substrate, curbs and equipment pads.
- F. Section 04 20 00 - UNIT MASONRY: Masonry partitions and walls.
- G. Section 07 92 00 - JOINT SEALANTS: Requirements for sealants and backing materials.

- H. Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING: General preparation and testing requirements of flooring substrate.
- I. Section 09 05 63 – MOISTURE VAPOR EMISSION CONTROL: Moisture mitigation of concrete slabs.
- J. Division 22 - PLUMBING: "floor-flange" type floor drains.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 2. All applicable federal, state and municipal codes, laws and regulations for flammability and smoke generation of interior finishes.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all products to be applied hereunder
 - a. Include certification of data indicating Volatile Organic Compound (VOC) content of all floor system components.
 - 2. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, integral base, and perimeter conditions.
 - a. The manufacturer's recommended methods of installation, when approved by the Architect, will be come the basis for inspecting and accepting or rejecting actual installation methods used on the Work.
 - 3. Certification: Material certificates signed by manufacturer certifying that the waterproof mechanical equipment room flooring complies with requirements specified herein.
 - 4. Selection samples:
 - a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
 - 5. Verification samples:
 - a. Samples of each level of slip resistance, aggregate, and pattern available in the specified products from the proposed manufacturer.
 - b. 12 x 12 inch samples of finished surface illustrating material color, texture and finish.
 - 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.

- b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
 - f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
- 1. Manufacturer's warranties: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.

1.5 QUALIFICATIONS

- A. Applicator: Company specializing in performance of the work of this Section with 5 years minimum documented experience and trained by manufacturer in installing resinous flooring types similar to that required for this Project, and who is acceptable to manufacturer of primary materials.

1.6 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain resinous flooring materials, including primers, resins, and finish coats, from a single manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site in sealed and labeled containers; container labeling shall include manufacturer's name, type of paint, color mix designation, expected coverage, surface preparation instructions, instructions for mixing and reducing, drying time, and clean-up recommendations.

- B. Store materials, conforming with applicable codes and fire regulations, in designated spaces. Keep storage area secure when direct access is not required or when not performing work under this Section. Take precautionary measures to prevent fire hazards and spontaneous combustion, maintain a dry-chemical type fire extinguisher in all areas where materials of this Section are being stored or used.
- C. Store materials in a well ventilated area at minimum ambient temperature of 45 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit.
- D. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle. Remove oily rags and waste each day.

1.8 PROJECT CONDITIONS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Apply flooring materials within temperature and humidity range specified by coating manufacturer.
- C. Provide sufficient lighting to maintain 80 foot-candles measured mid-height at substrate surface.

1.9 SEQUENCING AND SCHEDULING

- A. Immediately notify the Architect in writing of conditions which may require a change in the specifications of this Section before proceeding with the work. Failure to do so, in a timely fashion, so as not to interfere with the schedule of work of this Contract, shall be construed as acceptance of the coatings specified. Perform all corrective measures, at no cost to the Owner, for any defects in the work, resulting from the use of such materials.
- B. Do not order materials until all required schedules have been properly submitted, reviewed by the Contractor and Approved by Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Dur-a-flex Inc., East Hartford Ct.
 - 2. Crossfield Products Corp. (Dex-o-Tex), Roselle Park, NJ.
 - 3. General Polymers Corporation, Cincinnati OH. .

- 2.2 TYPE 1 URETHANE FLOORING SYSTEM DESCRIPTION (KITCHENS, WALK-IN COOLERS/FREEZERS, CULINARY ARTS, AND RELATED SPACES)
- A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Dur-a-Flex Inc., product: "Poly-Crete MDB".
 - 1. Acceptable flooring systems, or approved equal:
 - a. Dur-a-Flex Inc., product: "Poly-Crete MDB".
 - b. Crossfield Products Corp. (Dex-o-Tex), product: "Tek-crete SL-B".
 - c. Flowcrete North America, Inc., product: "Flowfresh HF."
 - B. General Description: Self leveling, aromatic cementitious mortar urethane system with broadcast quartz aggregate and urethane or polyaspartic elastomeric and heat resistance top coat.
 - 1. System thickness: 1/4 inch [6.3 mm].
 - C. Primer: As recommended by flooring system manufacturer.
 - D. Topping: Equal to Dur-A Flex, Inc., product Poly-Crete MD resin, hardener, and aggregate.
 - 1. Percent reactive: 100 percent.
 - 2. VOC: 0 g/L.
 - 3. Bond strength (ASTM D 4541): 400 psi, substrate failure.
 - 4. Compressive strength (ASTM C 579): 7,400 psi.
 - 5. Tensile strength (ASTM D 638): 1,800 psi.
 - 6. Impact Resistance @ 125 mils, MIL D-3134: 160 inch/lbs with no visible damage or deterioration.
 - E. Aggregate: Equal to Dur-A-Flex, Inc., product "Flintshot" quartz aggregate in color blend as selected by the Architect, or as required to match Architect's sample.
 - F. Topcoat: Equal to Dur-A-Flex, Inc., "Poly-Crete Color-Fast", aliphatic urethane two-component resin.
 - 1. VOC: 0 g/L.
 - 2. Compressive strength (ASTM C 579): 7,800 psi.
 - 3. Tensile strength (ASTM D 638): 4,200 psi.
 - 4. Flexural strength (ASTM D 790): 1,000 psi.
 - 5. Abrasion Resistance (ASTM D4060)
CS 17 wheel (1,000 g load) 1,000 cycles: 30 mg loss.
 - 6. Impact Resistance (ASTM D 1709): 160 in/lbs.
 - 7. Shore D Hardness (ASTM D 2240): 65
 - 8. Gloss (ASTM D 523) 60⁰: Semi-gloss appearance.
 - G. Accessory materials: Provide all accessory materials not specifically indicated, but are required to achieve the finishes specified.
-

2.3 TYPE 2 URETHANE FLOORING SYSTEM DESCRIPTION (LOCKER AND TOILET ROOMS, ACCESSIBLE SHOWERS AND B182 SERVING)

- A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Dur-A-Flex, Inc., product "Hybri-Flex EQ" self-leveling broadcast colored quartz, epoxy/aliphatic urethane topcoat seamless flooring system.
1. Acceptable flooring systems, or approved equal:
 - a. Dur-a-Flex Inc., product: "Hybri-Flex EQ".
 - b. Crossfield Products Corp. (Dex-o-Tex), product: "Tek-crete SL-B".
 - c. Flowcrete North America, Inc., product: "Flowfresh HF."
- B. Topping: Equal to Dur-A Flex, Inc., product Poly-Crete SL resin, hardener, and aggregate.
1. Percent reactive: 100 per cent.
 2. VOC: 0 g/L.
 3. Bond strength (ASTM D 4541): 400 psi, substrate failure.
 4. Compressive strength (ASTM C 579): 9,000 psi.
 5. Tensile strength (ASTM D 638): 2,175 psi.
 6. Flexural strength (ASTM D 790): 5,076 psi.
 7. Impact Resistance @ 125 mils, MIL D-3134: 160 inch lbs with no visible damage or deterioration.
- C. Aggregate: Equal to Dur-A-Flex, Inc., product "Q28" quartz aggregate in color blend as selected by the Architect, or as required to match Architect's sample.
- D. Broadcast and grout coats: Equal to Dur-A-Flex, Inc., product "Dur-A-Glaze No. 4 Resin" epoxy based two-component resin.
1. Percent reactive: 100 per cent.
 2. VOC: less than 4 g/L.
 3. Water absorption (ASTM D 570): 0.04 percent.
 4. Tensile strength (ASTM D 638): 4,000 psi.
 5. Coefficient of thermal expansion (ASTM D 696): 2×10^{-5} in/in/F.
 6. Flammability (ASTM D-635): Self-Extinguishing.
 7. Flame Spread (NFPA 101/ASTM E-84): Class A.
- E. Topcoat: Equal to Dur-A-Flex, Inc., "Armor Top", aliphatic urethane two-component resin.
1. VOC: 0 g/L.
 2. 60 Degree Gloss ASTM D523): 75+/-5.
 3. Mixed Viscosity, (Brookfield 25°C): 500 cps.
 4. Tensile strength, ASTM D 638): 7,000 psi.
 5. Abrasion Resistance (ASTM D4060)
CS 17 wheel (1,000 g load) 1,000 cycles: 4 mg loss with grit.
 6. Pot life @ 70° F 50% RH: 2 hours.

7. Full Chemical resistance: 7 days.
- F. Accessory materials: Provide all accessory materials not specifically indicated, but are required to achieve the finishes specified.
- 2.4 TYPE 3 URETHANE FLOORING SYSTEM DESCRIPTION (AUTO/DIESEL SHOP AND RECEIVING [Including A184 General Supply, A185 Custodian, A186 Recycle/Trash, B180.1 Receiving, A187 Corridor And B180 Corridor])
- A. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Dur-A-Flex, Inc., product "Hybri-Flex EB" self-leveling broadcast colored quartz, epoxy/aliphatic urethane topcoat seamless flooring system.
1. Acceptable flooring systems, or approved equal:
 - a. Dur-a-Flex Inc., product: "Hybri-Flex EQ".
 - b. Crossfield Products Corp. (Dex-o-Tex), product: "Tek-crete SL-B".
 - c. Flowcrete North America, Inc., product: "Flowfresh HF."
- B. Topping: Equal to Dur-A Flex, Inc., product Poly-Crete SL resin, hardener, and aggregate.
1. Percent reactive: 100 per cent.
 2. VOC: 0 g/L.
 3. Bond strength (ASTM D 4541): 400 psi, substrate failure.
 4. Compressive strength (ASTM C 579): 9,000 psi.
 5. Tensile strength (ASTM D 638): 2,175 psi.
 6. Flexural strength (ASTM D 790): 5,076 psi.
 7. Impact Resistance @ 125 mils, MIL D-3134: 160 inch lbs with no visible damage or deterioration.
- C. Broadcast coat: Equal to Dur-A-Flex, Inc., product "Shop Floor Resin" epoxy based two-component resin.
1. Percent reactive: 100 per cent.
 2. VOC: less than 8 g/L.
 3. Water absorption (ASTM D 570): 0.04 percent.
 4. Tensile strength (ASTM D 638): 4,000 psi.
 5. Coefficient of thermal expansion (ASTM D 696): 2×10^{-5} in/in/F.
 6. Flammability (ASTM D-635): Self-Extinguishing.
 7. Flame Spread (NFPA 101/ASTM E-84): Class A.
- D. Topcoat: Equal to Dur-A-Flex, Inc., "Armor Top", aliphatic urethane two-component resin.
1. VOC: 0 g/L.
 2. 60 Degree Gloss ASTM D523): 75+/-5.
 3. Mixed Viscosity, (Brookfield 25°C): 500 cps.
 4. Tensile strength, ASTM D 638): 7,000 psi.

5. Abrasion Resistance (ASTM D4060)
CS 17 wheel (1,000 g load) 1,000 cycles: 4 mg loss with grit.
 6. Pot life @ 70° F 50% RH: 2 hours.
 7. Full Chemical resistance: 7 days.
- E. Accessory materials: Provide all accessory materials not specifically indicated, but are required to achieve the finishes specified.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify Contractor of any condition that may potentially affect proper application of coatings.
- B. Measure moisture content of surfaces, do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Masonry or concrete: 12 percent.
- C. Beginning Work of this Section means acceptance of existing substrate surfaces and site conditions.

3.2 PREPARATION - GENERAL

- A. Mix and prepare coatings in strict accordance with manufacturer's written instructions. Thoroughly mix to ensure uniformity of color and mass, unless otherwise directed by the manufacturer of the specific coating used. Except for epoxy mixtures, strain previously opened materials to remove skins, coating lumps, and other foreign matter prior to painting. Dispose of epoxy materials which have begun to set.

3.3 APPLICATION - GENERAL

- A. Apply all materials in strict accordance with the approved manufacturer's printed instruction, and in accordance with the best trade practices. Each coat shall be reviewed and approved by the Architect before succeeding coats are applied.
- B. Do not apply successive coating until the preceding coat is thoroughly dry, except as otherwise specified, and in no case in less than minimum period of time recommended by manufacturer.
- C. Bridge sawcut joints with 3 inch wide fiberglass tape embedded in basecoat. Expansion joints must be honored.

3.4 SURFACE PREPARATION

- A. Upon acceptance of completed existing surfaces, thoroughly remove all dust and debris by sweeping or by vacuum cleaning.
- B. Remove laitance, curing sealers, existing adhesives and other foreign matter from concrete surfaces with necessary techniques such as shot blasting, muriatic acid etching, surface freezing and power scarification.

- C. Thoroughly remove etching solution by washing down surfaces with clean water; flooded at least three separate times at a rate of two gallons per ten square feet; thoroughly remove all contaminants that may be engrained or latent in surfaces.
- D. Perform a test application of a square foot in three locations, such as beneath casework. Allow to set for 72 hours, and test adhesion as recommended by the manufacturer.

3.5 FLOOR SURFACING

- A. Work shall be done only under optimum conditions as recommended by manufacturer. Surfaces over which matrix is to be applied shall be completely dry and thoroughly clean. Substrate and ambient temperature shall be 50 degrees F or above; if below 60 degrees F, temperature must be stable or rising.
- B. Allow surfacing to set undisturbed for a minimum period of 48 hours. Maintain temperature at 50 degrees F minimum until floor surfacing has completely cured.
- C. Finished surfaces shall be uniform in texture and pattern, and level within a degree of tolerance of 1/4 inch in 10'-0" in any direction.

3.6 INSTALLATION

- A. System shall be installed in accordance with the manufacturer's specifications and shall include the following minimum applications:
 - 1. Bonding coat of neoprene rubber and cement composition in aqueous dispersion applied by brush or trowel.
 - 2. Rot-resistant woven cloth fabric waterproof membrane applied into thickened liquid latex applied over floors and up verticals, bases, curbs, pipe sleeves, mechanical pads.
 - 3. Troweled smoothing coat of styrene butadiene liquid emulsion combined with alumnum cement and aggregate and applied to smooth off all laps and butt joints in membrane.
 - 4. Two finish roller applications of elastomeric latex coating in color as selected by the Architect.
 - 5. Cove base shall have a minimum of 2 inch cove. Cove shall splay back to meet door frames, forming a neat, sanitary base.
 - 6. Finished floor shall be 1/4 inch thick, smooth, uniform in color and free of trowel marks.
- B. Bonding coat, waterproof membrane and smooth coat shall be applied prior to the installation of mechanical equipment and shall cover all floor surfaces, bases, mechanical pads and pipe sleeves. Colored finish coats shall be applied to all surfaces after all equipment has been installed.
- C. Apply composition flooring up vertical abutting surfaces to form a coved base terminating 4 inches above floor in a feathered edge.
- D. Feather edge where composition flooring abuts dissimilar material.
- E. Allow surfacing to set undisturbed for a minimum period of 48 hours. Maintain temperature at 50 degrees F minimum until floor surfacing has completely cured.

- F. Finished surfaces shall be flush, true to plane, and shall be level within permissible degree of tolerance 1/4 inch in 10'-0" in any direction.

3.7 CLEANING

- A. Upon completion of the work in each area, remove all coating splatters from glass, prefinished surfaces, bright metals, and from other surfaces that have not been painted or finished hereunder. Do not use abrasive paper or abrasive cleaner on any prefinished surface or bright metal. Remove all materials and debris; leave work area in a clean condition.

3.8 PROTECTION AND TOUCH-UP

- A. General: Protect finished work under provisions of Section 09 05 60 – COMMON WORK RESULTS FOR FLOORING.
- B. Clean up the work area at end of each work day. Remove all cartons, debris, emptied containers, as the work progresses, and finally at completion of work of this Section Legally dispose of same off the Site.
- C. During application of coatings, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Properly clean, repair or replace any work so damaged and soiled.
- D. Protect all finished surfaces against damage until the date of final acceptance of the work. The Architect will conduct a final review of all work performed. Re-coat or touch-up, all scratches and other blemishes on surfaces, and as directed by the Architect, any areas found which do not comply with the requirements of this Section, and bear all costs therefor. Remove and dispose of floor protection as directed by Construction Manager.
- E. Any re-coating or touch-up work, required after the work of this Section has been reviewed and accepted by the Architect, will be paid for by the Contractor.

End of Section

Section 09 68 13
TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Prepare substrates to receive carpet tile as required to ensure specified tolerance level for finish surface of carpeting. Preparation work includes patching, smoothing and leveling subfloors and underlayment, including:
 - 1. Grinding down high spots of substrate.
 - 2. Providing Portland cement-based latex underlayment (filler).
- B. Furnish and install carpet tile and entrance mats directly adhered over floors, where indicated on the Drawings, including all accessories necessary to complete the work.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 20 00 - FINISH CARPENTRY: Installing metal thresholds.
- F. Section 08 71 00 - DOOR HARDWARE: Furnishing metal thresholds.
- G. Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING: General preparation and testing requirements of flooring substrate.

- H. Section 09 05 63 – MOISTURE VAPOR EMISSION CONTROL: Moisture mitigation of concrete slabs.
- I. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Straight resilient bases, where indicated in conjunction with carpeting.
- J. Section 14 24 24 – HOLELESS HYDRAULIC ELEVATORS: Elevator cabs to receive tile carpeting.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D 2859 - Test Method for Flammability of Finished Textile Floor Covering Materials.
 - 2. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 3. ASTM E 648 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - 4. NFPA: Publication 253 - Test for Critical Radiant Flux of Floor Covering Systems.
 - 5. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequencing:
 - 1. Sequence work to ensure resilient flooring is not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, wet work is dry and cured, and work overhead is completed.
 - 2. Ensure that installation of flooring and accessories occurs after other finishing operations and interior wet work is complete and fully cured, including painting.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, for each item furnished hereunder, including carpet, accessories, adhesives, and leveling materials.
 - 2. Manufacturer's installation instructions: Provide manufacturer's application methods or installation instructions for each item furnished hereunder.

- Indicate special procedures, and perimeter conditions requiring special attention.
3. Manufacturer's sample warranties.
 4. Manufacturer's certificate: Provide certificate stating that the carpet, and other related materials to be supplied hereunder meet all requirements specified herein.
 - a. Submit certification from the fiber producer verifying use of the branded fiber in the submitted carpet product.
 5. Shop drawings: 1/8 inch scale plans of all carpeted areas indicating direction of carpet, location of seams and method of joining seams.
 - a. Show location of different patterns or styles of carpet.
 6. Selection samples:
 - a. Sample swatches containing manufacturer's full color and blend range.
 - b. Vinyl edge strip sample illustrating manufacturer's full color range.
 7. Verification samples:
 - a. 12 inch long samples of edge strip.
 - b. After initial selection of carpet and color blends has been made by the Architect: 18 inches by 27 inches sample of selected carpet for final approval of the Architect. Approved samples shall be used as the standard of quality and colors for materials furnished under this Contract.
 8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
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- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
 - B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 - 1. Maintenance Data: Prior to Project Substantial Completion, deliver to the Architect copies of the carpet manufacturer's detailed maintenance recommendations for the care cleaning and stain-removal, and repair of the types of carpets installed. Include product data and Material Safety Data Sheets (MSDS) for cleaning materials.
 - C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 - 1. Extra Materials: Upon completion of the Work of this Section, Deliver to the Owner extra materials for future repairs and maintenance. Clearly label and package securely to prevent damage.
 - a. Owner's carpet tile stock: An amount equal to 3 percent of each color, pattern and type of carpet installed.
- 1.6 QUALITY ASSURANCE
- A. Applicator: Company specializing in carpet installation of the type specified herein with a minimum of three years documented experience.
- 1.7 MOCK-UPS
- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
 - B. Provide mock-up sample of one area to be designated by Architect, demonstrating the minimum quality of installation for the Work.
 - C. Locate mock-ups where directed and include all surfaces scheduled to receive a carpeted finish.
 - D. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
 - E. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.
- 1.8 ENVIRONMENTAL CONDITIONS
- A. Do not install carpet until areas have been fully enclosed and environmental conditions have reached the levels indicated during occupancy.
 - B. Store materials for 3 days (72 hours) prior to installation in area of installation to achieve temperature and humidity stability. Carpet and adhesive must be stored at a minimum temperature of 68 degrees F.

- C. Maintain a temperature of at least 60 degrees Fahrenheit, with a relative humidity of between 15 and 60 percent, for a period of 72 hours before, during, and after installation.
- D. Ventilate spaces where work of this Section occurs, during and for a period of 72 hours after completion of carpet installation. Ventilate to dissipate humidity, and to prevent accumulation of fumes, vapors, and gases. Provide temporary fan units and ducting as required for venting operations

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store all carpeting material under cover in dry, well-ventilated spaces as soon as delivered. Protect carpeting from damage, dirt, stain, moisture, and mildew.

1.10 WARRANTY

- A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Furnish carpet installer's written guarantee covering prompt and proper replacement of any and all carpeting which indicates improper installation workmanship and/or defective material within twelve months from completion of the installation and acceptance thereof by the Architect, said corrective work being performed by the Carpet installer at no cost to the Owner.
 - 2. Furnish carpet manufacturer's warranty which shall contain the following:
 - a. Commencement date for warranty: Date of Project Substantial Completion.
 - b. Wear Warranty - Lifetime of Carpet. No more than 10% face yarn loss by weight in normal use.
 - c. Static Warranty - Lifetime of Carpet.
 - d. Edge Ravel Warranty - Lifetime of Carpet. Guaranteed no edge ravel in normal use (no seam sealers required).
 - e. Delamination Warranty - Lifetime of Carpet. Guaranteed no delamination in normal use (no chair pads required).
 - f. Tuft Bind Warranty - Lifetime of Carpet. Guaranteed not to zipper, wet or dry.

1.11 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, deliver to the Owner extra carpet materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts:
 - 1. Flooring: 5 percent of each material in each color, and pattern installed.

PART 2 - PRODUCTS

2.1 CARPET TILE MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Interface, Inc., Atlanta, GA products "Ground Waves", "Harmonize", "Neighborhood Smooth Plank" and "Online Plank".

- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following or approved equal:
1. Interface, Inc., Atlanta, GA.
 2. Tandus US, LLC, Dalton, GA
 3. Lees Carpet Company, Greensboro NC.

2.2 CARPET TILE

- A. General requirements: Carpet tiles, shall conform with or pass tests of the following Standards:
1. CRI – Green Label Plus
 2. ASTM D-2859 (Methenamine Reagent Pill Test).
 3. ASTM E-648 (Flooring Radiant Panel Test): Class I (Minimum Average CRF of 0.48).
 4. NBS Smoke Chamber Test: Maximum average of 450.
 5. AATCC-134 (Electrostatic Propensity): Maximum electrostatic generation below level of human sensitivity.
- B. Recyclable requirements: Carpet, including all components, shall be 100 percent recyclable. Floor coverings selected shall be recycled at the end of their useful life in an environmentally responsible program. The full resource potential of returned material shall be utilized by reusing and recycling 100 percent of the returned carpeting in new, value-added products. No carpeting returned for recycling shall be land filled or incinerated.
- C. Carpet Type 1 criteria: Provide the following or acceptable equal having the specified characteristics and performance requirements:
1. Carpet tile, Interface, Inc., Atlanta, GA products "Harmonize".
 - a. Carpet tile criteria:

Construction:	Tufted textured loop
Fiber system:	100 percent recycled Type 6 nylon
Weight:	16 ounces per square yard
Gauge:	1/12 inch
Stitches per inch:	8
Pile height:	0.16 inch
Pile thickness:	0.106 inch
Density:	5,434 ounces per square yard
Dye method:	100 percent solution dyed
Primary backing material	GlasBac
Size:	9.845 inches by 39.38 inches
Color:	As selected by Architect.
Static control:	tested 3.0 kv. or less at 20 percent relative humidity.
Traffic classification:	Heavy

D. Carpet Type 2 criteria: Provide the following or acceptable equal having the specified characteristics and performance requirements:

1. Carpet tile, Interface, Inc., Atlanta, GA products "Ground Waves".

a. Carpet tile criteria:

Construction:	Tufted textured loop
Fiber system:	100 percent recycled Type 6 nylon
Weight:	16 ounces per square yard
Gauge:	1/12 inch
Stitches per inch:	8
Pile height:	0.13 inch
Pile thickness:	0.088 inch
Density:	6,545 ounces per square yard
Dye method:	100 percent solution dyed
Primary backing material	GlasBac
Size:	9.845 inches by 39.38 inches
Color:	As selected by Architect.
Static control:	tested 3.0 kv. or less at 20 percent relative humidity.
Traffic classification:	Heavy

A. Carpet Type 3 criteria: Provide the following or acceptable equal having the specified characteristics and performance requirements:

1. Carpet tile, Interface, Inc., Atlanta, GA products "Neighborhood Smooth Plank".

a. Carpet tile criteria:

Construction:	Tufted textured loop
Fiber system:	100 percent recycled Type 6 nylon
Weight:	16 ounces per square yard
Gauge:	1/12 inch
Stitches per inch:	8
Pile height:	0.13 inch
Pile thickness:	0.088 inch
Density:	6,545 ounces per square yard
Dye method:	100 percent solution dyed
Primary backing material	GlasBac
Size:	9.845 inches by 39.38 inches
Color:	As selected by Architect.
Static control:	tested 3.0 kv. or less at 20 percent relative humidity.
Traffic classification:	Heavy

A. Carpet Type 4 criteria: Provide the following or acceptable equal having the specified characteristics and performance requirements:

1. Carpet tile, Interface, Inc., Atlanta, GA products "Online Plank".

a. Carpet tile criteria:

Construction:	Tufted textured loop
Fiber system:	100 percent recycled Type 6 nylon
Weight:	16 ounces per square yard
Gauge:	1/12 inch
Stitches per inch:	8
Pile height:	0.13 inch
Pile thickness:	0.088 inch
Density:	6,545 ounces per square yard
Dye method:	100 percent solution dyed
Primary backing material	GlasBac
Size:	9.845 inches by 39.38 inches
Color:	As selected by Architect.
Static control:	tested 3.0 kv. or less at 20 percent relative humidity.
Traffic classification:	Heavy

- B. Check matching of carpet before installation and ensure there is no visible variation between dye lots.

2.3 ENTRANCE MAT MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Forbo Flooring Systems, Hazelton, PA products "Coral Brush" and "Coral Duo".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following or approved equal:
1. Forbo Flooring Systems, Hazelton, PA.
 2. Tandus US, LLC, Dalton, GA
 3. Lees Carpet Company, Greensboro NC.

2.4 ENTRANCE MATS

- A. Entrance Mat Type 1 criteria: Provide the following or acceptable equal having the specified characteristics and performance requirements:

1. Entrance Mat, Forbo Flooring Systems, Hazelton, PA "Coral Duo".
 - a. Entrance mat criteria:

Construction:	Textured loop
Fiber system:	100 percent polyamide
Gauge:	0.354 inch
Pile thickness:	0.24 inch
Dye method:	100 percent solution dyed
Primary backing material	Vinyl
Color:	As selected by Architect.

Static control: tested 0.0 kv. or less at 20 percent relative humidity.
Size: 20 inches by 20 inches.

A. Entrance Mat Type 2 criteria: Provide the following or acceptable equal having the specified characteristics and performance requirements:

1. Entrance Mat, Forbo Flooring Systems, Hazelton, PA "Coral Brush".

a. Entrance mat criteria:

Construction: Textured loop
Fiber system: 100 percent polyamide
Gauge: 0.354 inch
Pile thickness: 0.28 inch
Dye method: 100 percent solution dyed
Primary backing material: Vinyl
Color: As selected by Architect.
Static control: tested 0.0 kv. or less at 20 percent relative humidity.
Size: 20 inches by 20 inches.

2.5 ACCESSORIES

- A. Carpet tile edgebanding as provided by Interface, Inc., or approved equal.
- B. Carpet tile connectors: Compounded acrylic adhesive applied to PET polyester backing and release liner, 3 inches by 3 inches, zero (0) VOCs equal to Interface, Inc., product "TacTiles".
- C. Moisture reduction primer for carpet tile: Alkali and water resistant, CRI Green Label Plus approved, LEED compliant, penetrating, film-forming aqueous acrylic polymer for use on porous concrete surfaces to protect flooring installations up to 97 percent relative humidity and pH up to 11.0 equal to Interface, Inc., product "XL Brands 9511".
- D. Entrance mat adhesive:
1. General: Water resistant, acceptable to the resilient flooring manufacturer, for substrate conditions.
 2. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Forbo Industries Inc., Hazleton PA, product "Sustain 1195M" adhesive.
 3. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Forbo Industries Inc., Hazleton PA.
 - b. Advanced Adhesive Technology, Inc, Dalton GA.
 - c. DAP Incorporated, Dayton OH.
 - d. W.W. Henry Company, Aliquippa PA.
 - e. Roberts Consolidated Industries, Inc., City of Industry, CA.

- E. Transition strips, carpet reducers, edgings and accessories: Composition nitrile rubber alloy in colors as selected by the Architect.
 - 1. Acceptable manufacturers:
 - a. American Biltrite (Canada) Ltd., Sherbrooke, Quebec.
 - b. Burke Industries, San Jose, CA.
 - c. Roppe Corporation, Fostoria OH.
 - d. Freudenberg Building Systems Inc., Lawrence MA.
 - 2. Profiles as indicated, submit shop drawings for all conditions not indicated and obtain Architect's approval for each transition/reducer.

- F. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
 - 1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
 - 2. Quikrete Companies, product "Fast-Set Underlayment 1248".
 - 3. Silpro Masonry Systems Inc., product "Profinish".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Ensure that newly placed concrete has cured for a minimum period of 30 days and that moisture content of concrete is within range specified by adhesive manufacturer.
 - 2. Verify concrete substrate has been cured and is sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture test.
 - a. Insure that concrete substrate has a moisture content of not more than 3.5 percent by weight. Perform moisture test in several locations using carbide method dampness meter.
 - 3. Verify that surfaces are smooth and flat with a maximum variation of 1/4 inch in 10 feet, and are ready to receive work.
 - 4. Request correction of defects in receiving surfaces which are not correctable by the methods specified herein. Do not commence work until such defects are entirely corrected
 - 5. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. Surface Preparation:
 - 1. Remove by mechanical means (light sanding and grinding), all protruding edges, high spots. Ensure that substrate is free from paint, varnish, wax, oil, existing adhesive residue, or other foreign matter. Do not use solvents.

2. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler. Apply, trowel and float finish subfloor filler and leave a smooth, level, hard surface. Prohibit traffic from area until filler is cured.
 3. Apply troweled subfloor filler and leveler to provide finished concrete surface smooth, with no more than 1/8 inch variation from plane within 10 feet in any direction.
 - a. Prohibit traffic until filler and leveler is cured.
 4. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.
- B. Preheat areas to receive carpet to a minimum temperature of 60 degrees F for 72 hours prior to installation, with a relative humidity between 15 and 60 percent. Maintain minimum temperature of 60 degrees F thereafter.
- C. Measure all areas to receive materials to be furnished and installed hereunder, and verify in the field their actual dimensions, including wall-to-wall dimensions, offsets, door locations, and details, fixed equipment, and all other installed items. Extra charges will not be allowed because of lack of familiarity with actual project conditions. Small pieces of carpet will not be acceptable.

3.3 INSTALLATION

- A. Install moisture vapor reduction primer and carpet tile in accordance with carpet and adhesive manufacturers' instructions. Immediately notify Architect of conflicts. Cement corners of carpet tile with specified installation adhesive connectors.
- B. Lay carpet tile in a monolithic pattern, with joints and seams parallel to building lines. Lay joints straight and continuous in both directions and with border carpet tile not less than 1/2 the width of the tile.
1. Install carpet tile using quarter-turn method as recommended by manufacturer.
 2. Stripes shall be installed perpendicular to foot traffic (Entrance Mat Type 1).
- C. Install specified edging wherever carpeting abuts a dissimilar flooring material, except where wood thresholds, or resilient floor tile trim occurs.

3.4 CLEANING

- A. Daily clean work areas by disposing of carpet scraps. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of adhesives and other materials installed under this Section.
- B. Clean and vacuum carpet surfaces upon completion of the installation.

3.5 PROTECTION

- A. Prohibit traffic from carpet areas for 24 hours after installation.
- B. Protect carpet against damage during construction. Cover with not less than 6-mil thick polyethylene covering with taped joints during construction period whenever protection is required, so that carpet will be without any indication of deterioration, wear, or damage at time of completion. Remove and dispose of floor protection as directed by Construction Manager.

- C. Maintain protection of carpeting on each floor or area until work is accepted.

End of Section

Section 09 68 16
SHEET CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Prepare substrates to receive carpet as required to ensure specified tolerance level for finish surface of carpeting. Preparation work includes patching, smoothing and leveling subfloors and underlayment, including:
 - 1. Grinding down high spots of substrate.
 - 2. Providing Portland cement-based latex underlayment (filler).
 - 3. Cleaning subfloors as required for installation of carpet.
- B. Furnish and install carpeting directly adhered over floors, where indicated on the Drawings, including all accessories necessary to complete the work.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 45 29 - TESTING LABORATORY SERVICES: Relative Humidity, Moisture Vapor Emission and acidity/alkalinity (pH) Testing of concrete slab substrates.
- F. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- G. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

- H. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete substrate.
- I. Section 07 95 13 - EXPANSION JOINT COVER ASSEMBLIES: Prefinished joint assemblies for floors, walls and ceiling/soffit surfaces.
- J. Section 09 05 06 - COMMON WORK RESULTS FOR FLOORING: General preparation and testing requirements of flooring substrate.
- K. Section 09 05 63 – MOISTURE VAPOR EMISSION CONTROL: Moisture mitigation of concrete slabs.
- L. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Straight resilient bases, where indicated in conjunction with carpeting.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D 2859 - Test Method for Flammability of Finished Textile Floor Covering Materials.
 - 2. ASTM D 418 - Methods of Testing Pile Yarn Floor Covering Construction.
 - 3. ASTM D5116 - Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
 - 4. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 5. ASTM E 648 - Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 6. ASTM E 662 - Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 7. CRI Indoor Air Quality Testing and Labeling Program.
 - 8. NFPA: Publication 253 - Test for Critical Radiant Flux of Floor Covering Systems.
 - 9. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Pre-installation Meetings: Installer of the Work of this Section is required to attend pre-installation conference specified under Section 09 05 60 - COMMON WORK RESULTS FOR FLOORING.
- C. Sequencing:

1. Ensure that installation of flooring and accessories occurs after other finishing operations and interior wet work is complete and fully cured, including painting.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, for each item furnished hereunder, including carpet, accessories, adhesives, and leveling materials.
 2. Manufacturer's installation instructions: Provide manufacturer's application methods or installation instructions for each item furnished hereunder. Indicate special procedures, and perimeter conditions requiring special attention.
 3. Manufacturer's sample warranties.
 4. Manufacturer's certificate: Provide certificate stating that the carpet, and other related materials to be supplied hereunder meet all requirements specified herein.
 - a. Submit certification from the fiber producer verifying use of the branded fiber in the submitted carpet product.
 - b. Certification should include the % recycled content by weight for fibers, describing the source of this recycled content. If virgin nylon is used, the manufacturer shall include, as part of the fiber certification, the precise method that will be used to recapture the nylon at the end of the useful life of the carpet. State whether it will be returned to nylon carpet, yarn production, downcycled to an end use other than carpet yarn used for waste-to-energy conversion, or disposed of in a specified manner.
 5. Indoor Air Quality Test Reports: Submit for specified products, indicating that the test results do not exceed the stated emission criteria of the CRI Indoor Air Quality Testing Program.
 6. Recycling Instructions:
 - a. Submit written certification of environmental compliance describing all aspects of recycling programs for carpet uplifted for replacement and for carpet to be installed, including compliance by the carpet manufacturer and carpet trade contractor.
 - b. A representative from the carpet manufacturer shall meet with the contractor in the presence of a representative of the end user and architect/design firm to review the recommended procedures, prior to occupancy of the finished spaces.
 7. Shop drawings: 1/8 inch scale plans of all carpeted areas indicating direction of carpet, location of seams and method of joining seams.
 - a. In general, carpet layout shall comply with the following:
 - 1) All carpet to be laid in the same direction unless specifically shown otherwise.
 - 2) No seams shall occur at doorways and entries which are perpendicular to doors or entries.

- 3) Seams occurring at corridor change of direction shall follow wall parallel to carpet direction.
 - b. Show location of different patterns or styles of carpet.
 - 1) Show location of different fiber types, If mixed fiber types are used on the project, the fiber type must be clearly identified to facilitate future recycling.
 - c. Show locations of all threshold conditions.
8. Selection samples:
 - a. Sample swatches containing manufacturer's full color and blend range.
 - b. Resilient edge strip sample illustrating manufacturer's full color range.
9. Verification samples:
 - a. 12 inch long samples of edge strip.
 - b. After initial selection of carpet and color blends has been made by the Architect 18 inches by 27 inches sample of selected carpet for final approval of the Architect. Approved samples shall be used as the standard of quality and colors for materials furnished under this Contract.
10. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Flooring to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; Greenguard Gold; CRI Green Label Plus.
 - f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

- g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- 1. Maintenance Data: Prior to final acceptance of the carpet installation, carpet subcontractor shall deliver to the Architect 3 printed copies of the carpet manufacturer's detailed maintenance recommendations for the care cleaning and stain-removal, and repair of the types of carpets installed. Include product data and Material Safety Data Sheets (MSDS) for cleaning materials.
 - 2. When the installation is complete, the manufacturer shall deliver (1) a certificate of recycling, which describes the method by which the uplifted carpet was recycled; and (2) a warranty of recycling, which specifies the method by which the new carpet tile will be recycled at the end of its useful life.
- 1.6 QUALITY ASSURANCE
- A. Applicator: Company specializing in carpet installation of the type specified herein with a minimum of three years documented experience, approved by carpet manufacturer and participation in manufacturer's environmental program including responsible carpet removal, recycling, and installation.
- B. Environmental impact characteristics of carpet:
- 1. Product, inclusive of adhesive, to comply with the 1994 State of Washington protocol. The product, when tested as manufactured (no air-out period required), shall pass the protocol as written and shall have the following characteristics:
 - a. Less than 0.05 ppm (part per million) of formaldehyde.
 - b. Less than 0.50 mg/cubic meter of total volatile organics.
 - c. Less than 50 ug/cubic meter of total particulates.
 - d. Less than 1.0 ppb (part per billion) 4-PC.
 - e. Test over a 96 hour time period.
 - f. Submit compliance table.
 - 2. Carpet to be delivered with a recycle bag for recycling of the plastic film used to protect the Microencapsulated Tackifier.
 - 3. All carpet products must pass the University of Pittsburgh protocol for toxicity being "no more toxic than wood" when burned under the same conditions.
 - 4. Carpet to be a reduction barrier to radon flow.
 - 5. Carpet to provide asbestos enclosure properties. Enclosure means an airtight, impermeable, permanent barrier around ACBM (Asbestos Containing Building Material) to prevent the release of asbestos fibers into the air.
 - 6. Carpet to be installed without the use of wet adhesives.
 - 7. Company to have an in-place, operational recycling program for product (at the end of its useful life) and manufacturing waste. Program shall recycle 100 percent of the product in the same operation.
 - 8. This program shall not consist of incineration.
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1.7 MOCK-UPS

- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
- B. Provide mock-up sample of one area to be designated by Architect, demonstrating the minimum quality of installation for the Work.
- C. Locate mock-ups where directed and include all surfaces scheduled to receive a carpeted finish.
- D. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
- E. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1.8 ENVIRONMENTAL CONDITIONS

- A. Do not install carpet until areas have been fully enclosed and environmental conditions have reached the levels indicated during occupancy.
- B. Store materials for 3 days (72 hours) prior to installation in area of installation to achieve temperature and humidity stability. Carpet and adhesive must be stored at a minimum temperature of 68 degrees F.
- C. Maintain a temperature of at least 60 degrees Fahrenheit, with a relative humidity of between 15 and 60 percent, for a period of 72 hours before, during, and after installation.
- D. Ventilate spaces where work of this Section occurs, during and for a period of 72 hours after completion of curing. Ventilate to dissipate humidity, and to prevent accumulation of fumes, vapors, and gases. Provide temporary fan units and ducting as required to for venting operations
- E. Unroll carpet for a period of 72 hours prior to beginning of installation for adjustment to environmental conditions.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver carpet in sealed protective rolls and accessories in sealed containers. Bind carpet materials with secure protective wrapping. Mark each carpet roll according to style, color, pattern, dye lot, run number, and quantity.
- B. Waste Reduction: Collect polyethylene roll wrap at site and recycle into more roll wrap. Redirect small pieces of waste carpet to be appropriately recycled.
- C. Store all carpeting material under cover in dry, well-ventilated spaces as soon as delivered. Protect carpeting from damage, dirt, stain, moisture, and mildew.

1.10 SEQUENCING AND SCHEDULING

- A. Sequence work to ensure carpet is not installed until dust generating activities have terminated and work overhead is completed.

- B. Do not commence installation until painting and finishing work are complete, and ceiling and overhead work have been tested, approved, and completed.
- C. Install carpet after interior wet work is complete and fully cured.

1.11 WARRANTY

- A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Carpet manufacturer's 20 year printed, non-prorated warranty which shall include texture retention, wear, and static protection and edge ravel resistance and run resistance strength. Commencing on the date of substantial completion. All warranty items to be full term, not pro-rated, for the indicated period. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced at the discretion of the Manufacturer.
 - a. As a minimum, manufacturer's warranty shall include protection against:
 - 1) Excessive surface wear. Excessive wear means more than 15 percent loss of pile fiber weight measured before and after use.
 - 2) Edge ravel.
 - 3) Zippering.
 - 4) Backing delamination. Backing delamination is defined as separation of the secondary backing from the primary backing.
 - 5) Watermarking on any product not 100 percent loop construction. Watermarking means an apparent color difference between areas of the same carpet due to permanent pile reversal with random differences in pile lay direction and differences in the amount of light reflected by carpet fibers.
 - 6) Excessive static electricity. Excessive static electricity means more than 3.0 kilovolts when tested per AATCC 134 at a relative humidity of 20 percent and a room temperature of 70 degrees Fahrenheit.
 - b. Chair pads are not required for carpet warranty coverage.
 - c. All carpet warranties to be sole source responsibility of the Manufacturer. Second source warranties or warranties that involve parties other than the Manufacturer are unacceptable.
 - d. Carpet warranties will be official standard documents, not customized, and shall not be created on a job by job basis.
 - e. All carpet warranties shall be signed and notarized by a company representative.
 - 2. Carpeting installer's written guarantee covering prompt and proper replacement of any and all carpeting which indicates improper installation workmanship and/or defective material within twelve months from completion of the installation and acceptance thereof by the Architect, said corrective work being performed by the Carpeting installer at no cost to the Owner.

1.12 EXTRA MATERIALS AND MAINTENANCE DATA

- A. Upon completion of the Work of this Section, submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Extra Materials: Deliver to the Owner extra materials for future repairs and maintenance. Clearly label and package securely to prevent damage.
 - a. Owner's carpet stock: An amount equal to 3 percent of each color, pattern and type of carpet installed.
 - b. Stock not turned over to Owner: Recycle waste, unusable scrap, and broadloom carpet damaged during installation through manufacturer's environmental program.
2. Deliver specified overrun and usable pieces of carpet to owner's designated storage space, properly packaged and identified. Redirect small pieces of waste carpet to be appropriately recycled.
3. Maintenance Data: Prior to final acceptance of the carpet installation, carpet subcontractor shall deliver to the Architect 3 printed copies of the carpet manufacturer's detailed maintenance recommendations for the care cleaning and stain-removal, and repair of the types of carpets installed. Include product data and Material Safety Data Sheets (MSDS) for cleaning materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Tandus US, LLC, Dalton, GA products "District".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following or approved equal:
 1. Tandus US, LLC, Dalton, GA
 2. Lees Carpet Company, Greensboro NC.
 3. Mannington Carpets Inc., Calhoun, GA.
 4. The Mohawk Group, Atlanta GA.
 5. Shaw Industries Inc., Dalton, GA.

2.2 CARPET

- A. General requirements: Carpet, shall conform with or pass tests of the following Standards:
 1. CRI – Green Label Plus
 2. ASTM D-2859 (Methenamine Reagent Pill Test).
 3. ASTM E-648 (Flooring Radiant Panel Test): Class I (Minimum Average CRF of 0.48).
 4. NBS Smoke Chamber Test: Maximum average of 450.
 5. AATCC-134 (Electrostatic Propensity): Maximum electrostatic generation below level of human sensitivity.
- B. Recyclable requirements: Carpet, including all components, shall be 100 percent recyclable. Floor coverings selected shall be recycled at the end of their useful life in an environmentally responsible program. The full resource potential of returned material shall be utilized by reusing and recycling 100 percent of the returned

carpeting in new, value-added products. No carpeting returned for recycling shall be land filled or incinerated.

- C. Carpet criteria: Provide the following or acceptable equal having the specified characteristics and performance requirements:
1. Carpet, Tandus US, LLC, "District":
 - a. Carpet face criteria:

Construction	Patterned loop
Stitches per Inch	12.0
Gauge	5/64
Tuft Density:	153.6 tufts per square inch
Pile Height:	0.187 inches
Face Weight:	21 ounces per square yard
Density Factor	7,714 oz per cubic yard
Roll Width:	6 feet
Color:	As selected by Architect.
Fiber system:	Antron Lumena nylon
Dye Method:	Solution dyed
Primary Tufting Substrate:	Synthetic Non-woven
Backing:	Tandus "Powerbond" Cushion RSbacking with No. 54 "Seam-Weld" or approved equal.
Backing Weight:	35.5 oz. per square yard
Backing Density:	18.5 pounds per cubic feet
Backing Thickness:	0.156 inch
Backing Compression Set:	Maximum 10 percent
Backing Compression	Minimum 7 pounds at 25 percent.
- D. Colors/Patterns: Color as selected by Architect.
- E. Filler for patching, smoothing and leveling subfloors and underlayment: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
 2. Quikrete Companies, product "Fast-Set Underlayment 1248".
 3. Silpro Masonry Systems Inc., product "Masco Latex Cement"
- F. Primer: As recommended by the manufacturer.
- G. Adhesives for carpeting: NFPA Class A or UBC Class 1 types, as determined by ASTM E-84 Tunnel Test, as recommended by Carpet manufacturer for application and intended use. Acceptable manufacturers include:
1. Advanced Adhesive Technology, Inc, Dalton GA.
 2. DAP Incorporated, Dayton OH.
 3. W.W. Henry Company, Huntington Park CA.
 4. Macklanburg-Duncan Company, Oklahoma City, OK.
 5. Roberts Consolidated Industries, Inc., City of Industry, CA.

- H. Transition strips, carpet reducers, edgings and accessories: Composition nitrile rubber alloy in colors as selected by the Architect.
 - 1. Acceptable manufacturers:
 - a. Tarkett, Inc., Parsippany NH.
 - b. American Biltrite (Canada) Ltd., Sherbrooke, Quebec.
 - c. Burke Industries, San Jose, CA.
 - d. Roppe Corporation, Fostoria OH.
 - e. Freudenberg Building Systems Inc., Lawrence MA.
 - 2. Profiles as indicated, submit shop drawings for all conditions not indicated and obtain Architect's approval for each transition/reducer.
 - a. Vinyl stair nosings: Tarkett model type "SLN-XX-C" or approved equal in color selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Ensure that newly placed concrete has cured for a minimum period of 30 days and that moisture content of concrete is within range specified by adhesive manufacturer.
- C. Verify that surfaces are smooth and flat with a maximum variation of 1/4 inch in 10 feet, and are ready to receive work.
- D. Request correction of defects in receiving surfaces which are not correctable by the methods specified herein. Do not commence work until such defects are entirely corrected. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. Preheat areas to receive carpet to a minimum temperature of 60 degrees F for 72 hours prior to installation, with a relative humidity between 15 and 60 percent. Maintain minimum temperature of 60 degrees F thereafter.
- B. Remove sub-floor ridges, and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- C. Apply, trowel, and float filler to leave smooth, flat and hard surface, as required to ensure that carpeted surfaces will be level to within 1/8 inch tolerance in 10 feet in any direction.
- D. Prohibit traffic until filler is cured.
- E. Thoroughly sweep and vacuum substrate and remove all foreign matter.
- F. Measure all areas to receive materials to be furnished and installed hereunder, and verify in the field their actual dimensions, including wall-to-wall dimensions, offsets, door locations, and details, fixed equipment, and all other installed items. Extra

charges will not be allowed because of lack of familiarity with actual project conditions. Use largest carpet widths to produce minimum number of seams. Small pieces of carpet will not be acceptable.

- G. Unroll carpet for adjustment to environmental conditions at least 72 hours prior to installation.

3.3 INSTALLATION – CARPET

- A. Install carpet in accordance with carpet and environmentally approved carpet adhesive manufacturers' instructions. Immediately notify Architect of conflicts.
- B. Layout carpet with location of seams per approved shop drawings.
- C. Cement carpet directly to the substrate with specified installation adhesive. Trowel adhesive evenly on the substrate. Install the carpet within thirty minutes after spreading adhesive.
 - 1. Apply a 6 inch wide band of specified seaming adhesive continuously at each seam location, before bedding the carpet therein, ensuring that each carpet edge will be embedded therein at least 3 inches.
 - 2. Apply a continuous band of specified edge adhesive around entire perimeter edge of each carpeted area, and embed the carpeting therein.
- D. Roll all carpet areas with a 30 pound carpet roller to ensure proper contact of carpet with adhesive, and to remove all bubbles and buckles. Carefully roll seams and edges with the roller centered over the seam.
- E. Run all carpet in the same direction. Plan and install carpet in all areas so that single pieces per area shall be used to the fullest extent possible. No seams will be permitted in areas which are 12 feet, or less, in width.
- F. Carefully measure all cut-outs at the project.
- G. Make all seams in carpeting by back-cutting the carpet on an angle so that the face yarn of abutting pieces intermingles, and provides a practically invisible transition at each seam location.
 - 1. Center seams, occurring at door openings, parallel to, and directly under, the doors.
 - 2. Seams occurring at corridor changes in direction shall follow wall line parallel to carpet direction.
 - 3. Do not center seams in travel path to doors.
- H. Do not center seams in path, perpendicular to, in the path of, or travel to doors.
- I. Install specified edging wherever carpeting abuts a dissimilar flooring material, except where wood thresholds, or resilient floor tile trim occurs.

3.4 CLEANING

- A. Daily clean work areas by disposing of carpet scraps.
- B. Remove debris; sort pieces from carpet scraps to redirected and recycled.

- C. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from deposits of adhesives and other materials installed under this Section.
- D. Clean and vacuum carpet surfaces upon completion of the installation.

3.5 PROTECTION

- A. Prohibit traffic from carpet areas for 24 hours after installation.
- B. Protect carpet against damage during construction. Cover with 6-mil thick polyethylene covering with taped joints during construction period whenever protection is required, so that carpet will be without any indication of deterioration, wear, or damage at time of completion.
- C. Damaged carpet will be rejected and recycled. As carpet is installed, remove trimmings, excess pieces of carpet, and installation materials.
- D. Maintain protection of carpeting on each floor or area until work is accepted. Remove and dispose of floor protection as directed by Construction Manager.

End of Section

Section 09 77 33
SANITARY WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. USDA approved glass fiber reinforced plastic panels.
 - 2. Installation adhesive, non-corroding fasteners, vinyl moldings, and all other components.
 - 3. Silicone sealant for all joints between panels and moldings, and between panel system and abutting materials.
- B. Install access panels occurring in plastic panels furnished by Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Plywood substrate, and blocking.
- F. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Hollow metal door frames to receive ends of panel system.
- G. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.

- H. Section 09 30 13 - CERAMIC TILING: tile base at ceramic tiling.
- I. Section 09 30 16 - QUARRY TILING: tile base at kitchen areas.
- J. Section 09 29 00 - GYPSUM BOARD: Gypsum board substrate:
- K. Division 21 - FIRE SUPPRESSION: Fire suppression system.
- L. Division 26 - ELECTRICAL: Recessed electrical receptacles.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM D 256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - 2. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
 - 3. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
 - 4. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 5. ASTM D 2583 - Barcol Hardness.
 - 6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 8. All applicable federal, state and municipal codes, laws and regulations regarding wall finishes and smoke generation.

1.4 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
 - 2. Certification: Manufacturer's written certification stating that panel system and all related components to be furnished hereunder, meet or exceed the requirements specified under this Section that all fire-resistive requirements for the indicated requirements have been met.
 - 3. Shop drawings: 1/4 inch scale elevations showing panel joint locations.
 - 4. Selection samples:
 - a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
 - 5. Verification samples:
 - a. 12 inch by 12 inch samples of panel illustrating material and finish.
 - 6. LEED Submittal Requirements:

- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
- b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Ceiling and Wall Systems (gypsum board products, insulation, acoustical ceiling systems and wall coverings) to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: SCS Indoor Advantage Gold; UL Greenguard Gold.
- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- g. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- B. Qualifications:
 - 1. Installer specializing in applying the work of this Section with a minimum of 3 years experience and approved by product manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver panels to the project until all concrete, masonry, plaster, and other wet work has been completed and dry.
- B. Remove panels from shipping cartons/skids. Stack panels on a solid flat, dry surface. Do not stack panels direct on concrete flooring or any other surface that

emits moisture. Lay Panels flat; do not stand panels on edge, do not store products near a heat source.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Crane Composites, Joliet IL. No substitution will be accepted.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following
 1. Crane Composites, Joliet IL., (Glasbord and Kemlite Products).
 2. Marlite Inc., Dover OH (Marlite FRP products).
 3. Nudo Products, Inc., Springfield, IL. (Fiber-Lite Products).

2.2 REGULATORY REQUIREMENTS

- A. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.

2.3 MATERIALS

- A. Panels: Fiberglass reinforced plastic panels, ASTM E-84 Class A Fire Retardant Rated, having embossed / pebble finish.
 1. Panel Thickness: 0.09 inch (2.3mm) thickness.
 2. Performance Requirements:
 - a. Flexural Strength (ASTM D 790): 13.6×10^3 psi (94Mpa).
 - b. Flexural Modulus (ASTM D 790): 0.60×10^6 psi (4137 MPa).
 - c. Tensile Strength (ASTM D 638): 7.1×10^3 psi (49 MPa).
 - d. Tensile Modulus (ASTM D 638): 0.92×10^6 psi (6343 Mpa).
 - e. Hardness (ASTM D 2583): Barcol Hardness 40.
 - f. Impact Strength ASTM D 256): 12.0 ft-lb/in notched (0.64 J/mm).
 - g. Taber Abrasion Resistance (Taber Test, CS-17 wheel, 1000 gram weight, 25 cycles): 0.02% maximum weight loss.
 3. Panel Color: as selected by Architect from Manufacturer's standard colors.
 4. Acceptable products include the following:
 - a. Crane Composites, Kemlite product: "Glassbord Embossed Texture | FX".
 - b. Marlite product: "Marlite Standard FRP" panels (Class 1/A).

- c. Nudo products: Inc., "Fiber-Lite LP-F9-FR wall panels." (Class A).

2.4 ACCESSORIES

- A. Aluminum trim: Heavy weight extruded aluminum 6063-T5 alloy prefinished at the factory.
1. Finish: Factory thermo-set enamel or powder coat finish.
- B. Fasteners: stainless steel or nylon fasteners as recommended by the panel manufacturer for the application indicated in the Drawings.
- C. Adhesive: Multi-purpose non-flammable, non-staining, construction adhesive: Kemlite No. 260, Henry No. 444, or equal.
- D. Sealant: One part acetoxo silicone rubber sealant, USDA approved as recommended by panel manufacturer.
- E. Moldings: One piece extruded vinyl moldings, color matched with panels, for application between abutting panels, inside and outside corners, and panel edges as recommended by the panel manufacturer and where indicated in the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of blocking, backing and support framing for work of this Section. Inspect all gypsum wall and plywood substrates and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. Surfaces receiving work of this Section must be absolutely dry, free from dirt, dust, grease and other foreign materials that will prevent proper adhesion of the wall panels.
- B. Verify gypsum board substrate surfaces are flat, conforming to Gypsum Association specifications for a Level 3 finish.
- C. Plywood substrate surfaces should be flat to within 1/8" in 10 feet, Sand smooth high spots, and fill low spots with wood filler approved by panel manufacturer.

3.3 INSTALLATION, GENERAL

- A. Install work in strict accordance with the manufacturer's written instructions.
- B. Set and secure materials in place, plumb and level. Maintain 1/4" gap at ceiling and junction with flooring base. Maintain 1/8 inch gap between panels and division bar molding to allow for normal expansion and contraction. Allow 3/16 inch around pipes, electrical fitting and other projections.

3.4 APPLICATION OF PANELS WITH ADHESIVE

- A. Ensure that both panels and substrate are free of moisture, dirt, dust and other contaminants which may affect the bond of adhesive.
- B. Apply adhesive when temperature is between 50 and 90 degrees F.
- C. Trowel adhesive evenly on back of sheets, 1/4 deep with square notch trowel, or apply with cartridge gun spacing beads not more than 8 inches in center of panel and run a single bead along all edges of panel.
- D. Set panels in position and press against wall. Pull panel away from wall to flash off solvents. Press panel against wall again, apply adequate pressure to make full contact between panel and wall. Brace panel along vertical edges until adhesive is cured.
- E. Apply mechanical fasteners along top and bottom edges as specified in Article 3.04 above.

3.5 APPLICATION OF SEALANT AND MOLDINGS

- A. Install sealant and moldings, in sequence as recommended by the panel manufacturer to achieve a moisture resistant application of the panel system.
- B. After installation of panels and moldings has been completed, apply a continuous bead of specified sealant to all joints between the work of this Section and abutting surfaces. Tool the sealant to a uniformly dense surface, level with the edges of moldings. Immediately remove all excess sealant from finished surfaces.
 - 1. Install joint bead back-up in joints with abutting materials where joints are in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.
 - a. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
 - 2. Apply sealant into joints in accordance with sealant manufacturer's instructions, using mechanical or power caulking gun equipped with nozzle of appropriate size, with sufficient pressure to completely fill the joints.
 - a. The depth of sealant shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
 - b. Maintain the outer edge of the sealant, where side faces of joints are in the same plane, back 1/8-inch from the faces.
 - c. After placement of the sealant in joints with abutting materials, concave-tool the surfaces to uniform density, using a water-wet tool. Do not use detergents or soapy water for the tooling operations.
 - d. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

3.6 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris and scraps.

- B. Completely clean all panel surfaces, clean all surfaces of adjacent surfaces which have been marked or soiled by the work of this Section, removing all excess sealants and adhesives with solvents which will not damage the surfaces in any way.
- C. Upon completion of the work of this Section, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

3.7 PROTECTION

- A. During the operation of sealant work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled.

End of Section

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Section 09 81 00
ACOUSTICAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of acoustical insulation where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.
- B. Furnish and install:
 - 1. Acoustical insulation as scheduled and where indicated.
 - 2. Mineral wool insulation at interior area of roof curbs as detailed on Drawings.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Wood framing, blocking, nailers.
- F. Section 06 20 00 - FINISH CARPENTRY: Acoustical batt insulation behind acoustical wood panels.
- G. Section 07 21 00 – THERMAL INSULATION.
- H. Section 07 26 00 - VAPOR RETARDERS:
 - 1. Vapor barriers and in walls, floor assemblies and roof assemblies.

- I. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Installation of wall board over acoustical insulation.
- J. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Ductwork and piping insulation.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 518 - Thermal Transmission Properties by Means of the Heat Flow Meter.
 - 2. ASTM C 553 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 3. ASTM C 612 - Mineral Fiber Block and Board Thermal Insulation.
 - 4. ASTM C 665 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 5. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - 6. ASTM E 96 - Water Vapor Transmission of Materials.

1.4 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 - 2. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions

requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.

- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
- f. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Ceiling and Wall Systems (gypsum board products, insulation, acoustical ceiling systems and wall coverings) to provide CDPH Standard Method v1.1 – 2010 emissions compliance. Products tested/certified under the following programs will meet the emissions requirement: SCS Indoor Advantage Gold; UL Greenguard Gold.
- g. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- h. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

- 1. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- 2. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

B. Storage and Handling Requirements:

- 1. Store materials under cover and in manner to keep them dry, protected from weather, direct sunlight and damage from construction traffic and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

- 1. Acoustical mineral fiber insulation:
 - a. Roxul, Inc., Milton, Ontario. .
 - b. Fibrex Insulations Inc., Sarnia, Ontario
 - c. Thermafiber Inc., Wabash IN.
 - d. Johns Manville, Inc., Denver CO.

2.2 MATERIALS

A. Acoustical batt insulation at fire rated walls and partitions: Mineral wool fiber insulation batts, conforming to ASTM C665 Type 1, and ASTM C553 with a

nominal density of 2.5 pounds per cubic foot, nominally 3-1/2 inches thick, or as otherwise indicated on the Drawings.

1. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723).
 2. Recycled content of slag in mineral wool insulation: Use maximum available percentage of material (slag). Mineral wool insulation products incorporated into the work shall contain not less than 75 percent of recycled material (slag) by weight.
 3. Acceptable products include:
 - a. Roxul, Inc., product "Roxul AFB".
 - b. Fibrex Insulations Inc. product: "Fibrex Sound Attenuation Fire Batt (SAFB)"
 - c. Thermafiber, Inc. product "Thermafiber SAFB".
- B. Acoustical batt insulation at non-rated walls and partitions: Unfaced glass fiber insulation nominal 3-1/2 inches [89mm] thick conforming to ASTM C 665 Type I, of width appropriate for spacing of framing or furring members with which used.
1. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723).
 2. Recycled content of glass in glass-fiber insulation: Use maximum available percentage of recycled glass. Fiber glass insulation products incorporated into the work shall contain not less than 20 percent of recycled glass cullet.
- C. Acoustical batt insulation at interior areas of roof curbs: Mineral wool fiber insulation board, conforming to ASTM C612, Type IVB having a nominal density of 4.4 pounds per cubic foot.
1. Non-combustible as tested per ASTM E-136.
 2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
 3. Thickness: As indicated on Drawings.
 4. Size: As required to fit framing bays and other related conditions.
 5. Acceptable products include the following or approved equal:
 - a. Roxul, Inc., Milton, Ontario, product "Roxul ComfortBatt"
 - b. Thermafiber Inc., Wabash IN. product "Thermafiber UltraBatt."
 - c. Johns Manville, Inc., Denver CO. product: "TempControl".
- D. Acoustical Joint Sealer (Acrylic acoustical): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable.
1. Tremco, product "Acoustical Sealant".
 2. USG, product "USG Acoustical Sealant".
 3. Pecora, product "AC-20 FTR".

2.3 ACCESSORIES

- A. Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each insulation type.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Acoustical insulation:
 - 1. Install insulation in accordance with insulation manufacturer's instructions.
 - 2. Install in interior walls where indicated. Trim insulation neatly to fit spaces. Fit insulation tight in spaces. Leave no gaps or voids.

3.2 APPLICATION OF ACOUSTICAL SEALANT

- A. General: Install sealant and backing in accordance with the recommendations of ASTM C 919 and sealant manufacturer's recommendations.
 - 1. Perform preparation in accordance with C-790. Thoroughly clean all joints, removing all loose mortar, grease, dust, and other foreign materials that will prevent proper adhesion of primers and sealant materials.
 - 2. If so recommended and furnished by the specific sealant manufacturer, apply primer to all joint surfaces, taking care not to stain adjacent surfaces.
- B. Seal all penetrations in walls and partitions whether or not designated for "acoustical" insulation. Penetrations to receive sealant include electrical boxes, plumbing, heating and air conditioning ducts, telephone, intercom hookups, conduit, piping and similar items.
 - 1. Install joint bead backup in all joints in excess of 5/8-inch depth, and joints that have no backup therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.
 - a. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
 - b. Do not stretch back-up material into joints.
 - c. Install bond breaker wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.
 - 2. Apply sealant in continuous beads without open joints, voids or air pockets.
 - a. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
 - 3. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

3.3 CLEANING

- A. Daily clean work areas by sweeping and disposing of debris and scraps.
- B. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

Section 09 84 00
ACOUSTICAL ROOM COMPONENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install interior acoustical panel systems for walls, complete with all supporting accessories and associated work required for a complete assembly. Work includes, the following panel types/designations:
 - 1. Fabric wrapped acoustical panels; 2 inch thick.
 - 2. Wood fiber acoustical panels; 2 inch thick.
 - 3. Acoustical wood diffusers.
 - 4. Auditorium house reflectors.
 - 5. Flag support system at Lobby.
 - 6. Flags at Lobby.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.

- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.

- E. Section 06 10 00 - ROUGH CARPENTRY: Concealed wood blocking and nailers.

- F. Section 06 20 00 - FINISH CARPENTRY: Snap trim systems.

- G. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-load bearing partition framing and furring.

- H. Section 09 29 00 – GYPSUM BOARD: Gypsum board substrate.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. ASTM C 423 - Test Method for Sound Absorption and Sound Absorption Coefficients by 2 Reverberation Room Method.
 2. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
 3. ASTM E 699 - Practice for Criteria for Evaluation of Agencies Involved in Testing Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E-6.
 4. ASTM E795 Standard Practices for Mounting Test Specimens During Sound Absorption Tests.
 5. NFPA 701 - Vertical Burn Test.
 6. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, installation instructions for hardware, adhesives and accessories furnished hereunder.
 2. Certification: Submit a certificate of compliance direct from manufacturer(s) to specified acoustical and fire performance criteria for each type of acoustical product specification with independent laboratory test results.
 - a. Dimensioned 1/4 inch scale elevations/plans, bearing dimensions of actual measurements taken at the project, where practical indicate on elevations, arrangement of joints, and panel identification numbers for ease of installation.
 - b. Large scale design details showing attachment method; edge and joint conditions.
 3. Shop drawings: Large scale design details, showing spline attachment and edge fastening methods; and complete installation details.
 4. Selection samples:
 - a. Provide sample chains of all fabrics (for each acoustical panel type) for Architect's selection of colors and finishes.
 - b. Furnish large samples (6 by 9 inches minimum) of individual fabrics for selection as requested by Architect.
 5. Verification samples: Furnish 24 by 24 inch samples of each acoustical panel type, with selected fabrics applied.
 6. LEED Submittal Requirements:

- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
7. Maintenance information: Fabric maintenance data and recommended cleaning materials, and cleaning and stain removal methods.
 8. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.

1.5 QUALITY ASSURANCE

- A. Fire performance characteristics: Fabric panel assembly tested in accordance with ASTM E84 with gypsum wall board substrate, is UL rated Class A, with the following results.
 1. Flame Spread: 25 or less.
 2. Smoke Developed: 450 or less.
- B. Single Source Responsibility for Acoustical Wall Panels: Obtain each type of acoustical wall and ceiling panels from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the progress of the Work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Do not deliver interior materials to the project until all concrete, masonry, plaster, and other wet work has been completed and dry. Prior to panel installation the site must be free of all wet and dusty trades and the climatic conditions stabilized to normal operational levels. Panels shall be allowed to stabilize on site 24 hours prior to installation.
- C. Ship and handle all materials and fabricated items in a manner which will prevent damage thereto, and store all materials and fabricated items at a dry, elevated, ventilated, and protected interior location maintaining 60 degrees Fahrenheit and a maximum relative humidity of 55 percent.
- D. Deliver prefabricated panels to site with concealed panel identification numbers corresponding to identical numbers on shop drawings. Schedule delivery of panels to prevent delays of the Work, and minimize on-site storage.

- E. Store materials inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- F. Panels must only be handled by persons wearing clean light-weight gloves. It is very important that personnel installing hardware (clips, screws, ceiling suspension systems, hanger wires.) do not handle the panels before putting the clean lightweight gloves on.

1.7 PROJECT CONDITIONS

- A. Maintain ambient temperature between 60 and 85 degrees Fahrenheit, and a relative humidity between 20 and 50 percent for a period starting 24 hours before installation of upholstered wall system, and maintain until Owner's Final Acceptance.

1.8 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.
 - 1. Where field measurements cannot be made without delaying the Work, guarantee opening dimensions and proceed with fabrication of acoustical wall panels without field measurements. Coordinate wall construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.9 WARRANTY

- A. Furnish warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS which shall cover installed products against defects in materials and workmanship for a period of one year.

1.10 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials described below matching products installed, packaged with protective covering for storage and identified with appropriate labels:
 - 1. Acoustical wall panels: Furnish quantity of full size units equal to 3 percent of the amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Conwed Corporation, Ladysmith, WI.
 - 2. Armstrong World Industries, Inc., Lancaster, PA.
 - 3. Kinetics Noise Control, Dublin, OH.
 - 4. Decoustics, Etobicoke, Ontario, Canada.

5. Sound Concepts Canada, Inc., Manitoba, Canada
6. Abell Acoustics, LLC, Aurora, IL.
7. Corporate Acoustic Systems, Poughkeepsie, NY.
8. eNoise Control, Westfield, IN.
9. Tectum Inc., Newark, OH.
10. Wenger Corporation, Owatonna, MN.
11. Koroseal Interior Products Group, Fairlawn, OH.

2.2 PANEL MATERIALS

- A. Acoustic Wall Panels Type P1 (at Cafeteria, Language Lab, Chorus/Band Rooms, Large Group Seminar Room, Auditorium, Lobby and select Corridors): Factory assembled units consisting of a 6-7 pcf medium density glass fiber core laminated, tackable, fabric wrapped. Fabric shall be fully adhered with mitered corners and wrapped a minimum of 1 inch to panel back full perimeter.
 1. Basis of Design: Conwed Designscape, product "Acoustical WallPanel" panels or approved equal.
 2. Panel thickness: 2 inch.
 3. Panel width: As indicated.
 4. Panel edge: Square edge.
 5. NRC: Not less than 0.90.
 6. Mounting style: Concealed "Z" clips with epoxy adhesive applied after final adjustment.
- B. Acoustic Wall Panels Type P2 (at Art, Cafeteria, Ensemble/Practice Rooms, Gymnasium, Wellness and Art Classrooms): Factory assembled units consisting of wood fibers bonded with inorganic hydraulic cement, fabric wrapped. Fabric shall be fully adhered with mitered corners and wrapped a minimum of 1 inch to panel back full perimeter.
 1. Basis of Design: Tectum "Finale - Fabri-Tough" wall panels or approved equal.
 2. Panel thickness: 2 inch.
 3. Panel width: As indicated.
 4. Panel edge: Square edge.
 5. Mounting style: Concealed "Z" clips with mechanically fastened continuous angle at base and epoxy adhesive applied after final adjustment.
- C. Acoustic Wood Diffusers Type P4 (at Auditorium): Factory assembled units consisting of solid wood, planks cut with shaping tools creating equal width wells of varying depths based on reflection phase grating principles. The well depths shall be determined by a quadratic residue theory sequence to optimize sound diffusion. There shall be a sequence of 7 elevations across the panel face.
 1. Basis of Design: Kinetics Noise Control "HighTones" wall panels or approved equal.
- D. Fabric Facing:

1. General: All fabric shall be in compliance with local and State fire regulations. Flame resistant treatment shall be applied to back of fabric only.
2. Basis of Design: Provide fabric equal to Guilford of Maine, Wellington Contract Fabrics, or Architect approved equal.
 - a. Content: 100 percent olefin.
 - b. Minimum weight: 17 ounces per linear foot.
 - c. Width: 54 inches.
3. Color and pattern: As selected by the Architect from full range of available colors/patterns.

2.3 ACCESSORIES AND HARDWARE

- A. Screws: Flat-head wood screws of the appropriate sizes, galvanized finish.
- B. Mechanical panel mounting system: Concealed Z-clips and wall mounting clips, recessed into panel to allow back of panel to lie flush with wall surface.
 1. Self aligning, 20 gage hot-dipped galvanized steel.
 2. Leveling clip angle: 20 gage hot-dipped galvanized steel angle.
- C. Flag support system: Stainless steel cable system including all fasteners, anchors, tensioners, turnbuckles and other accessories.
- D. Flags: 2 foot by 3 foot, quantity: 100.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and blocking with Installer present, for compliance with requirements for installation tolerances and other conditions affecting acoustical wall panel performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install acoustical panels in locations indicated, following installation recommendations of panel manufacturer. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.
- B. Install panels to construction tolerances of plus or minus 1/16 in for the following:
 1. Plumb and level.
 2. Flatness.
 3. Width of joints.

3.3 CLEANING

- A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

B. Remove surplus materials, trimmed portions of panels, and debris resulting from installation.

C. Clip loose threads; remove pills and extraneous materials.

3.4 PROTECTION OF FINISHED WORK

A. Provide protection of installed acoustical panels until completion of the Work.

B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect, before time of substantial completion.

End of Section

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Section 09 91 00
PAINTING
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 09)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 09 00 09 – PAINTING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 09.

1.2 SUMMARY

- A. Summary: This Section consists of painting work where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Painting work includes, but is not limited to the surface preparation and application of coated finishes, and subsequent touch-up, of interior and exterior items and surfaces as indicated on the Contract Drawings and as scheduled herein.
1. No attempt is made in this Section to list all surfaces, fixtures and equipment requiring painting on this project. It is the responsibility of the Trade Contractor to determine for itself the scope and nature of the Work required for a complete installation from the information provided herein and in the Drawings.
- B. Surfaces and Materials: In general, without limiting the generality thereof, the following surfaces, fixtures and equipment require a painted finish:
1. Gypsum board partition and wall surfaces, ceilings and soffits.
 2. Interior handrails and guardrails where indicated on Drawings.
 3. Exterior galvanized/epoxy-primed handrails, guardrails and other miscellaneous metal fabrications.
 4. Concrete masonry units.
 5. Exterior woodwork.
 6. Metal doors and frames.
 7. Exposed to view structural steel.
 8. Exposed to view structural steel with intumescent or cementitious fireproofing.
 9. Exposed to view steel lintels.
 10. Wood trim, interior and exterior.
 11. Roof top equipment.
 12. Exposed to view sprinkler piping.
 13. Exposed to view electrical conduit and raceways.
 14. Exposed to view portions of ducts, (interior side) at diffusers.
 - a. Color: Flat black.

15. Elevator ladder, exposed to view lintels and other miscellaneous metal items furnished under Section 05 50 00 - METAL FABRICATIONS which are not factory finished.
 16. Access panels and frames.
 17. Exposed to view metal HVAC ductwork including but not limited to Auditorium, Cafeteria and Auto/Diesel shops.
 18. Grids, clamps, fasteners, hangers, pipes linear diffusers, speakers, access points and all other unpainted or unfinished items at back of Auditorium.
 19. Catwalks and tormentors within Auditorium.
 20. Door and frame to Gallery.
 21. HVAC supply diffusers and return grilles located in walls and at exposed-to-view locations not in ACT ceiling systems.
 22. Concrete floors beneath fixed Auditorium seating and at Auto/Diesel shops.
 23. Painting of inside of ducts at grilles and diffusers.
 24. Painting of exposed-to-view concrete slabs.
 25. Vent stacks through roof.
 26. Exposed exterior plumbing.
 27. Plywood backerboards for all trades.
 28. Field prime and paint aluminum expansion joint covers.
- C. DO NOT PAINT the following surfaces and materials.
1. Concealed from view surfaces, except as indicated otherwise in the Contract Documents or as specified herein.
 2. Chrome or nickel plating, stainless steel, bronze, brass.
 3. Aluminum other than mill finished or factory primed.
 4. Factory finished mechanical and electrical equipment, pumps, machinery and similar items which occur in mechanical, storage or equipment rooms or areas.
 5. Factory finished materials, specialties, and accessories unless otherwise specified.
 6. Ceramic tile, porcelain tile, terrazzo tread/risers and tile, acoustical tile, resilient flooring, wood flooring, and other integrally finished floor, wall and ceiling finishes.
 7. Prefinished millwork items.
 8. Applied cementitious fireproofing.
 9. Fire resistant testing and certification labels, code required labels, safety warning labels, performance rating plates, nomenclature plates, identification plates, and similar other labels.
- D. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid

proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.3 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete partitions and walls.
- F. Section 04 20 00 - UNIT MASONRY: Concrete masonry partitions.
- G. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Shop priming of structural steel framing.
- H. Section 05 50 00 - METAL FABRICATIONS: Shop priming of designated miscellaneous metals.
- I. Section 06 20 00 - FINISH CARPENTRY: Wood trim items.
- J. Section 07 54 19 POLYVINYL CHLORIDE (PVC) ROOFING – Vent stacks through roof.
- K. Section 07 92 00 - JOINT SEALANTS: Requirements for sealant and backing materials.
- L. Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES: Filling minor surface damage, shop priming of metal frames and steel doors.
- M. Section 08 14 16 - FLUSH WOOD DOORS: Wood doors, both prefinished and unfinished.
- N. Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same: Shop primed access panels, occurring in partitions and walls.
- O. Section 09 00 09 – PAINTING TRADE CONTRACT REQUIREMENTS: Trade contract requirements for work of this Section.
- P. Section 09 29 00 - GYPSUM BOARD: Drywall partitions, ceilings and soffits, including joint treatment and sanding.

- Q. Document 09 91 13 - EXTERIOR PAINTING SCHEDULE: Painting schedule for exterior surfaces and materials:
- R. Document 09 91 23 - INTERIOR PAINTING SCHEDULE:
 - 1. Painting schedule for interior surfaces and materials.
 - 2. Painting schedule for Mechanical and Electrical Equipment.
- S. Section 10 40 00 – SAFETY SPECIALTIES: Shop priming of cabinet doors and frames; shop finishing of cabinet.
- T. Division 22 - PLUMBING: Prefinished items such as plumbing fixtures, sprinkler heads, convectors, anemostates and similar surfaces and materials.
- U. Division 26 - ELECTRICAL: Prefinished items such as light fixtures, switch gear, electrical distribution cabinets and similar surfaces and materials.
- V. Respective sections: Mechanical, plumbing, fire protection and electrical equipment.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI/ASTM D 16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
 - 2. ASTM D 2016 - Test Method for Moisture Content of Wood.
 - 3. All applicable federal, state and municipal codes, laws and regulations for flammability and smoke generation of interior finishes.

1.5 DEFINITIONS

- A. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials specified herein, whether used as prime, intermediate or finish coats.
- B. Sheen: Specular gloss readings in accordance with ASTM D52
 - 1. Flat: less than 5 (measured at 85 degrees)
 - 2. Eggshell: 5 – 20 (measured at 60 degrees)
 - 3. Satin: 15-35 (measured at 60 degrees)
 - 4. Low Luster: 25 – 35 (measured at 60 degrees)
 - 5. Semi-Gloss: 30 -65 (measured at 60 degrees)
 - 6. Gloss: 65 or more (measured at 60 degrees)
- C. Gloss as defined for VOC requirements. Specified specular gloss readings below are as tested in accordance with ASTM D52.
 - 1. Flat: less than 15 (measured at 85 degrees), less than 5 (measured at 60 degrees).

2. Non-Flat: greater than 15 (measured at 85 degrees), greater than 5 (measured at 60 degrees).

1.6 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all finishing products to be applied hereunder.
 - a. Include certification of data indicating Volatile Organic Compound (VOC) content of all paint materials.
 2. Samples:
 - a. Manufacturer's color selector for custom mixed colors for Architect's color scheduling.
 - b. Opaque coatings: Two 9 by 12 inch finished samples on hardboard of each color scheduled in each finish for review and approval. Identify boards with finish type, color mix number and scheduled substrate surfaces or materials.
 - c. Transparent finishes and stains: Two 9 by 12 inch finished samples on same species of solid wood and plywood to be furnished under Section 06 20 00 - FINISH CARPENTRY, of each color scheduled in each finish for review and approval. Identify boards with finish type, color mix number and scheduled substrate surfaces or materials.
 3. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, Exterior-Applied Products (adhesives, sealants, coatings, roofing and waterproofing materials) to demonstrate VOC

compliance in accordance with CARB 2007 SCM for Architectural Coatings and SCAQMD Rule 1168 – July 1, 2005.

- f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- g. Include submittal documentation requirements for MR Credit 4 Building Product Disclosure and Optimization – Material Ingredients for HPDs.

B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

- 1. Color chips: After final approval of all colors and tints by the Architect, submit to the Owner, color chips of all coatings used, with manufacturer's name and mix designation of the coating for the purpose of future re-ordering of coatings. Color chips shall be at least six (6) square inches in size, for each color and tint.

1.7 QUALITY ASSURANCE

A. Single source responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Environmental Requirements for Volatile Chemicals:

- 1. For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:
 - a. Flat Paints and Coatings: VOC not more than 50 g/L.
 - b. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
 - c. Anti-Corrosive Coatings: VOC not more than 250 g/L.
 - d. Clear wood finishes:
 - 1) Varnishes: VOC not more than 350 g/L.
 - 2) Lacquer: VOC not more than 550 g/L
 - e. Floor coatings: VOC not more than 100 g/L
 - f. Sealers:
 - 1) Waterproofing sealers: VOC not more than 250 g/L.
 - 2) Sanding sealers: VOC not more than 275 g/L.
 - 3) All other sealers: VOC not more than 200 g/L.
 - g. Stains: VOC not more than 250 g/L.
- 2. Do not use water based paints formulated with aromatic hydrocarbons (organic solvent with a benzene ring in its molecular structure), formaldehyde, halogenated solvents, mercury or mercury compounds, or tinted with pigments of lead, cadmium, chromium VI and their oxides. Water based paints shall be low VOC and shall have a flash point of 61 degrees C or greater.
- 3. Where it is necessary to use solvent-based paints, with less than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
- 4. The following shall be low VOC and not be formulated with aromatic hydrocarbons (organic solvent with a benzene ring in its molecular structure).

- a. High performance water based acrylic coatings.
 - b. Pigmented acrylic sealers.
 - c. Catalyzed epoxy coatings.
 - d. High performance silicone grafted epoxy coatings.
5. Restricted Components: Paints and coatings used on this Project shall not contain any of the following compounds. (Excluded from this restriction are residual quantities of naturally occurring elements and chlorinated organics which are found in chlorinated water supplies; contaminate levels shall be below that of the National Primary Drinking Water Standard):
- a. 1,2-dichlorobenzene
 - b. Alkylphenol ethoxylates (APEs)
 - c. Formaldehyde-donors
 - d. Heavy metals, including lead, mercury, cadmium, hexavalent chromium and antimony in the elemental form or compounds
 - e. Phthalates
 - f. Triphenyl tins (TPT) and tributyl tins (TBT).

1.8 FIELD SAMPLES

- A. Provide field samples under provisions of Section 01 45 00 - QUALITY CONTROL for purpose of verifying selected colors.
- B. Paint on-site sample areas, minimum 40 square feet, illustrating selected color, and tint.
- C. Locate samples where directed. The Contractor shall provide in the base Contract, a total amount of samples equal to one sample per room.
- D. Accepted samples may not remain as part of the work.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site in sealed and labeled containers; container labeling shall include manufacturer's name, type of paint, color mix designation, expected coverage, surface preparation instructions, instructions for mixing and reducing, drying time, and clean-up recommendations.
- B. Store materials, conforming with applicable codes and fire regulations, in designated spaces. Keep storage area secure when direct access is not required or when not performing work under this Section. Take precautionary measures to prevent fire hazards and spontaneous combustion, maintain a dry-chemical type fire extinguisher in all areas where materials of this Section are being stored or used.
- C. Store paint materials in a well ventilated area at minimum ambient temperature of 45 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit.
- D. Do not use the sanitary system for mixing or disposal of refuse material. Carry water to mixing rooms and dump waste material in a suitable refuse receptacle. Remove oily rags and waste each day.

1.10 PROJECT CONDITIONS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent unless required otherwise by manufacturer's instructions.
- C. Apply paints and finishes above minimum temperature conditions in strict accordance with manufacturer's instructions.
- D. Provide sufficient lighting to maintain 80 foot-candles measured mid-height at substrate surface.

1.11 SEQUENCING AND SCHEDULING

- A. The applicator of work specified herein is responsible to ensure that all paints, enamels, and coatings, proposed to be applied hereunder, are compatible with coatings used for shop-primed items and items which have been prime-coated under the work of other trades.
- B. Immediately notify the Architect in writing of conditions which may require a change in the specifications of this Section before proceeding with the work. Failure to do so, in a timely fashion, so as not to interfere with the schedule of work of this Contract, shall be construed as acceptance of the coatings specified. Perform all corrective measures, at no cost to the Owner, for any defects in the work, resulting from the use of such materials.
- C. Painting work should be scheduled so as to minimize touch-ups. Interior painting is to be without flashmarks. Should flashmarks occur due to touch-ups, the Contractor shall be required to redo the entire surrounding wall surface.
- D. Do not order materials until all required schedules have been properly submitted, reviewed by the Contractor and Approved by Architect.

1.12 EXTRA MATERIALS

- A. Provide a minimum of (2) one gallon containers of all paints and finishes, to the Owner of each color and finish scheduled herein.
 - 1. Label each container with paint mix number, and identify locations where color and tint was used.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Paints and general finishes:
 - a. Benjamin Moore & Company, Montvale, NJ.

- b. California Paints, Andover MA.
 - c. Akzo Nobel Paints, LLC, Glidden Professional, Strongsville, OH.
 - d. Akzo Nobel Paints, LLC, Devoe High Performance Coatings, Strongsville, OH.
 - e. Pittsburgh Paints / PPG Industries, Inc., Pittsburgh PA.
 - f. Pratt & Lambert Inc., Buffalo, NY.
 - g. Sherwin Williams, Cleveland OH.
 - h. Tnemec Company, Inc., Kansas City, MO.
2. Interior stains and clear finishes for wood
 - a. Samuel Cabot, Inc., Boston MA.
 - b. PPG Architectural Finishes Inc., Olympic Home Care Products Division, Pittsburgh PA.
 3. Cold galvanizing touch-up paint:
 - a. ZRC Worldwide Inc., Marshfield MA.
 - b. Duncan Galvanizing, Malden Ma.
 - c. Rustoleum Corp., Vernon Hills IL.
 4. Caulking:
 - a. Pecora Corporation, Harleysville PA.
 - b. Sonneborn Building Products Inc., Minneapolis MN.
 - c. Tremco, Beachwood OH.
 5. Concrete sealers:
 - a. Dayton-Superior, Miamisburg OH.
 - b. Nox-Crete Inc., Omaha NE.
 - c. L&M Construction Chemicals, Inc.

2.2 MATERIALS

- A. Coatings: Ready mixed, except for field catalyzed coatings with good flow and brushing properties; capable of drying or curing free of streaks or sags. Color pigments shall be processed to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating. Provide best quality grade, where manufacturer makes more than one grade of any material specified.
- B. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.
 1. VOC limit: not more than 250 g/L.
 2. Specified manufacturer and product: ZRC Worldwide, Marshfield MA, product "ZRC-221".

- C. Joint sealant for fill of minor cracks prior to painting: One component acrylic latex caulking compound, conforming to FS 19-TP-21M and ASTM C 834, paintable within 24 hours after application, with a minimum movement capability of ± 12.5 percent, equal to one of the following:
 - 1. Pecora, product "AC-20+".
 - 2. Sonneborn Building Products Inc., product, "Sonolac".
 - 3. Tremco, product, "Tremflex 834".
 - 4. Sherwin Williams product "Loxon 1K Smooth".

- D. Concrete sealer: Transparent non-yellowing water based acrylic sealer having a minimum of 10 percent solids with a maximum VOC limit of 100 g/L. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Manufacturers:
 - a. Dayton-Superior, Miamisburg OH, product "Ultra Seal 30 EF".
 - b. Nox-Crete Inc., Omaha NE, product "Cure & Seal 100E".
 - c. L&M Construction Chemicals, Inc., product "Permaguard SPS".
 - 2. Primer/bonding agent: As recommended by sealer manufacturer.

2.3 ACCESSORIES

- A. Accessory materials: other materials not specifically indicated, but are required to achieve the finishes specified of commercial quality.

- B. Cleaning Materials:
 - 1. Tri-Sodium Phosphate (TSP) substitute products:
 - a. Savogran, Norwood MA, products "TSP-PF", or "Liquid TSP Substitute".
 - b. Custom Building Products, Seal Beach, CA., product "Custom T.S.P. Substitute".
 - c. DAP Inc., Baltimore MD., product "T.S.P. Substitute Heavy Duty Cleaner".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify Contractor of any condition that may potentially affect proper application of coatings.

- B. Measure moisture content of surfaces, do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Masonry or concrete: 12 percent.
 - 2. Interior wood: 15 percent.

- C. Beginning Work of this Section means acceptance of substrate surfaces and site conditions.

3.2 PREPARATION

- A. Furnish and lay suitable drop cloths in all areas where coating work is being done to protect floors and all other surfaces from damage during the work. Protect adjoining surfaces with painters mask tape.
- B. Prior to preparing surfaces or finishing, remove all finish hardware for painting doors and frames, except hinges and locks on exterior door; remove electrical plates, light fixture trim and fittings. Re-install hardware and other removed items after painted surfaces are thoroughly dry.
- C. Mix coatings thoroughly, unless otherwise directed by the manufacturer of the specific coating used, to ensure uniformity of color and mass. Strain previously opened coatings to remove skins, lumps, and other foreign matter prior to painting.
- D. Thin or reduce materials only as recommended by the specific material manufacturer, and only with the approval of the Architect.
- E. Impervious surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to thoroughly dry.
- F. Concrete and unit masonry surfaces scheduled to receive paint finish:
 - 1. Remove all loose scale and mortar, dirt, salt or alkali powder and other surface contaminates, using a detergent expressly formulated for cleaning of concrete and masonry.
 - 2. Remove oil and grease with a solution of tri-sodium phosphate.
 - 3. Remove stains caused by weathering corroding metals with a solution of sodium metasilicate after thoroughly wetting with water.
 - 4. Thoroughly rinse the cleaned surfaces with clear water, and allow the surfaces to completely dry, allow a minimum of 4 hours before commencing application of coatings.
- G. Uncoated steel and iron surfaces:
 - 1. Remove grease, scale, dirt, rust, and all foreign materials, down to bright metal by wire brushing, scraping, sanding, or sandblasting where heavy coatings of scale are evident.
 - 2. Wash steel with solvent, apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned.
 - 3. Spot prime after repairs with alkyd base metal primer product of the finish coating manufacturer.
- H. Shop primed steel surfaces:
 - 1. Remove rust, blistered and defective shop prime paint, and all foreign materials, down to bright metal by wire brushing, scraping, sanding, or commercial paint remover. Feather edges to make touch-up patches inconspicuous.
 - 2. Remove all grease or dirt with mineral spirits.
 - 3. Spot prime bare metal with alkyd base metal primer product of the finish coating manufacturer. Seal top and bottom edges of metals doors with primer.

- I. New galvanized surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- J. Aluminum surfaces scheduled for paint finish:
 - 1. Remove surface contamination by steam or high pressure water.
 - 2. Remove oxidation with acid etch and solvent washing.
 - 3. Apply etching primer immediately following cleaning.
- K. Interior wood items scheduled to receive paint finish.
 - 1. Smooth minor defects and remove all foreign matter by sanding, and if necessary, steel wool.
 - 2. Wash sap spots and knots with mineral spirits. When dry, touch up knots, pitch streaks, and sappy sections with commercial stain sealer.
 - 3. Fill up nail holes and cracks with wood putty or plastic wood after primer of first coat of finish is dry, and sand smooth.
- L. Gypsum board surfaces: Fill minor defects with latex based spackle. Spot-seal all compound surfaces and repair areas in gypsum board, with specified first coat material before application of the first coat.

3.3 APPLICATION

- A. Apply all materials in strict accordance with the approved manufacturer's printed instruction, and in accordance with the best trade practices. Each coat shall be reviewed and approved by the Architect before succeeding coats are applied.
- B. Do not apply successive coating until the preceding coat is thoroughly dry, and in no case in less than 24 hours after the preceding coat.
- C. Number of coats is indicated under Painting Schedules. Number of coats is indicated as a minimum number to be applied over scheduled substrates. An additional coat or coats may be required for proper color coverage of substrate as determined by the Architect, at no additional cost to the Owner. Examples of these conditions include, but are not limited to:
 - 1. Dark colored substrates may require an additional primer or intermediate coat to stabilize color, if final applied top-coat color is light.
 - 2. Pre-finished or pre-primed products may require an additional field applied coat to stabilize the shop/factory applied base color prior to application of top-coat finishes.
 - 3. Dark color top coat finishes may require additional finish coat over white or light colored substrates to obtain correct color density.
- D. Apply each coat to a uniform finish; Apply primer and first coat of slightly lighter in color tint than the scheduled color of the final coat.
- E. Sand lightly between coats to achieve required finish and remove sanding dust prior to applying succeeding coat.
- F. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

- G. Prime back surfaces of all interior and exterior woodwork scheduled for painted finish with primer.
 - H. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
- 3.4 APPLICATION – CONCRETE MASONRY
- A. Apply epoxy block filler to concrete masonry partitions at maximum rate allowed by coating manufacturer. Apply by airless spray followed by back rolling to force material into voids. Use a squeegee to remove excess material prior to initial set, and provide a smooth surface texture. After initial set, touch-up and fill apparent voids and holidays with fresh material.
- 3.5 APPLICATION – CONCRETE SEALER
- A. Apply sealer with manufacturer's recommended sprayer, at recommended rate of 400 square feet per gallon. Apply second coat when sealer is dry to touch. Allow sealer to cure undisturbed for a minimum period of 6 hours. Maintain temperature at 60 degrees Fahrenheit minimum until floor surfacing has completely dry.
- 3.6 CLEANING
- A. Upon completion of the work in each area, remove all coating splatters from glass, prefinished surfaces, bright metals, and from other surfaces that have not been painted or finished hereunder. Do not use abrasive paper or abrasive cleaner on any prefinished surface or bright metal. Remove all materials and debris; leave work area in a clean condition.
- 3.7 PROTECTION AND TOUCH-UP
- A. During painting work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Properly clean, repair or replace any work so damaged and soiled.
 - B. Protect all painted surfaces against damage until the painter is complete. CM/Architect to review. Painter to include cost to touch up all painted door jambs.
 - C. Any re-coating or touch-up work, required after the work of this Section has been reviewed and accepted by the Architect, will be paid for by the Contractor.
- 3.8 PAINTING SCHEDULE
- A. Colors: The Architect will furnish a schedule of colors for each area and surface. Tinting and matching shall be to the satisfaction of the Architect. No limit is placed on the number of colors that may be required, a maximum of four (4) colors will be utilized in any room or space with the exception of the Gymnasium where a maximum of six (6) colors will be required. Premium paints of deep-hued, bright, pigment intensive, accent and primary colors may be scheduled for up to 25 percent of all interior and exterior surfaces without additional cost to the Owner.
 - 1. Colors of priming coats (and body coats where specified) shall be lighter in tint than those of finish coat.

2. Colorants: Pure, non-fading pigments, mildew-proof, ultra-violet resistant, finely ground in approved medium; and be limeproof, when used in coatings to be applied on masonry, concrete, plaster, and gypsum board surfaces.
- B. Paint Schedule for exterior surfaces and materials: Refer to Document 09 91 13.
- C. Paint Schedule for interior surfaces and materials: Refer to Document 09 91 23.
- D. Painting Schedule for mechanical and electrical equipment: Refer to Document 09 91 23.

End of Section

Document 09 91 13
EXTERIOR PAINTING SCHEDULE
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 09)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 09 00 09 – PAINTING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 09.
- B. General: Number of coats scheduled herein below is minimum required, refer to Article entitled “APPLICATION” in specification Section 09 91 00 - PAINTING, regarding coverage.

1.2 PAINTING SCHEDULE FOR EXTERIOR SURFACES AND MATERIALS

- A. Exterior CONCRETE and CONCRETE MASONRY, walls scheduled for painted finish:
 - 1. One coat block primer.
 - a. California: “Mason-Cote Block Filler”, N°. 3751.
 - b. Glidden Professional: Concrete Coatings Block Filler Interior/Exterior N°. 3010.
 - c. Moore: “Superspec Latex Block Filler”, 160 Series.
 - d. Pittsburgh: “Speedhide Exterior Latex Masonry Block Filler”, 6-15 Series.
 - e. Sherwin-Williams: “Loxon Ext. Masonry Acrylic Primer”, B25 W300.
 - 2. Two coats 100-percent-acrylic semi-gloss paint:
 - a. California: “2010 Acrylic Latex Exterior Satin Gloss”, N°. 402.
 - b. Glidden Professional: Fortis 450 Exterior N°. 6207V.
 - c. Moore: “Aura Exterior Semi-Gloss”, N°. 632.
 - d. Pittsburgh: “Manor Hall Timeless – Semi-Gloss”, 73-510 Series.
 - e. Sherwin-Williams: No equivalent.
- B. Exterior METAL, ALUMINUM, new, mill finish and as scheduled to receive paint:
 - 1. One coat primer:
 - a. California: “Rust-Stop DTM Primer/Finish”, N°. 1061.
 - b. Devoe Coatings: Devflex 4020PF DTM Primer and Flat Finish.
 - c. Moore: “Acrylic Metal Primer”, N°. P04.
 - d. Pittsburgh: “Pitt-Tech DTM Primer/Finish”, 90 Series.
 - e. Sherwin-Williams: “DTM Acrylic Primer/Finish”, B66W1 Series.
 - 2. Two coats acrylic gloss enamel:
 - a. California: Everlife 100% Acrylic Waterborne High Gloss “, N°. 521.

- b. Devoe Coatings: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
 - c. Moore: "Acrylic Gloss Enamel", N°. P28.
 - d. Pittsburgh: "Pitt-Tech DTM Exterior Waterborne High Gloss Enamel", 90-300 Series.
 - e. Sherwin-Williams: "DTM Acrylic Gloss Coating", B66 Series.
- C. Exterior METAL, FERROUS, new, shop primed and existing:
- 1. One coat rust inhibitive primer. (touch up bare metal at existing and shop primed surfaces).
 - a. California: "Everlife Oil-based Metal Primer, N°. 21150.
 - b. Devoe Coatings: Devguard 4160 Multi-Purpose Tank & Structural Primer.
 - c. Moore: "Universal Metal Primer" N°. P07.
 - d. Pittsburgh: "Speedhide Industrial Rust Inhibitive Primers", 7-852 Series .
 - e. Sherwin-Williams: "Kem Kromik Universal Metal Primer", B50Z Series.
 - 2. Two coats acrylic gloss enamel:
 - a. California: "Everlife 100% Acrylic Waterborne High Gloss ", N°. 521..
 - b. Devoe Coatings: Devflex 4208QD Waterborne Gloss Enamel.
 - c. Moore: "Acrylic Gloss Enamel", N°. P28
 - d. Pittsburgh: "Pitt-Tech DTM Exterior Waterborne High Gloss Enamel", 90-300 Series.
 - e. Sherwin-Williams: "DTM Acrylic Gloss", B66 Series
- D. Exterior METAL, GALVANIZED (including epoxy-primed items):
- 1. Wash primer apply if recommended by individual paint manufacturer.
 - 2. One coat primer (touch up with compatible primer at epoxy-primed surfaces).
 - a. California: "Rust-Stop DTM 100% Acrylic Latex Semi-Gloss".
 - b. Devoe Coatings: Devflex 4020PF Direct To Metal Primer and Flat Finish.
 - c. Moore: "DTM. Acrylic Gloss Enamel", WM28
 - d. Pittsburgh: "Pitt-Tech Int/Ext Industrial DTM Primer/Finish Enamel", 90-712 Series.
 - e. Sherwin-Williams: "DTM Acrylic Primer/Finish", B66-W1 Series.
 - 3. Two coats of gloss finish direct-to-metal acrylic enamel paint.
 - a. California: "Rust-Stop DTM 100% Acrylic Latex Semi-Gloss".
 - b. Devoe Coatings: Devflex 659 Gloss DTM Waterborne Acrylic Enamel.
 - c. Moore: "DTM Acrylic Gloss Enamel", WM28
 - d. Pittsburgh: "Pitt-Tech Int/Ext Industrial DTM Primer/Finish Enamel", 90-374 Series.
 - e. Sherwin-Williams: "DTM Acrylic Coating", B66-100 Series.
- E. Exterior WOOD TRIM, windows and doors, new, primed and previously painted:

1. One coat 100%-acrylic latex primer at bare wood. (Touch up primed and previously painted surfaces)
 - a. California: "Fres-Coat Trouble-Shooter 100% Acrylic Latex Primer", N°. 45100/45101.
 - b. Glidden Professional: Stain Stomper Exterior Primer Sealer N°. 2110.
 - c. Moore: "Moore Fresh Start All Purpose 100% Acrylic Primer", N°. 023.
 - d. Pittsburgh: "Sun-Proof Exterior House & Trim Latex Wood Primer", 72-1 Series.
 - e. Sherwin-Williams: "A100 Exterior Latex Wood Primer", B42W41 Series.
 2. Two coats latex satin paint:
 - a. California: "Acrylic Latex House Paint", N°. 471.
 - b. Glidden Professional: Ultra-Hide 150 Exterior Satin N°. 2412V.
 - c. Moore: "Superspec Exterior Satin Finish", 184 Series.
 - d. Pittsburgh: "Speedhide Exterior Acrylic Satin", 6-2045 Series.
 - e. Sherwin-Williams: "A-100 Exterior Latex Satin House and Trim Paint" A82 Series.
- F. Exterior METAL, FERROUS, new, shop primed:
1. One coat rust inhibitive primer. (touch up bare metal at existing and shop primed surfaces).
 - a. California: "Larcoloid Primer, N°. 21150.
 - b. Devoe Coatings: Devguard 4160 Multi-Purpose Tank & Structural Primer.
 - c. Moore: "Universal Metal Primer" N°. P07.
 - d. Pittsburgh: "Speedhide Industrial Rust Inhibitive Primers", 7-852 Series .
 - e. Sherwin-Williams: "Kem Bond High Solids Primer", B50 Series.
 2. Two coats acrylic gloss enamel:
 - a. California: "Larcoloid Acrylic", N°. 511XX.
 - b. Devoe Coatings: Devflex 4208QD Waterborne Gloss Enamel.
 - c. Moore: "Acrylic Gloss Enamel", N°. P28
 - d. Pittsburgh: "Pitt-Tech DTM Exterior Waterborne High Gloss Enamel", 90-300 Series.
 - e. Sherwin-Williams: "Pro Industrial DTM Acrylic Gloss", B66 Series.

End of Document

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Document 09 91 23
INTERIOR PAINTING SCHEDULE
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 09)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 09 00 09 – PAINTING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 09.
- B. General: Number of coats scheduled herein below is minimum required, refer to Article entitled “APPLICATION” in specification Section 09 91 00 - PAINTING, regarding coverage.

1.2 PAINTING SCHEDULE FOR INTERIOR SURFACES AND MATERIALS

- A. Interior concrete floors, (Where scheduled to be sealed or painted):
 - 1. One coat floor paint:
 - a. Sherwin-Williams: “H&C Clear Liquid Hardner and Densifier”, Amorphous Colloidal Silica Solution.
 - b. Moore: “V156 Epoxy Sealer”.
 - c. Glidden Professional: Concrete Coatings Polyurethane Floor Enamel No 3018.
- B. Interior CONCRETE walls and partitions:
 - 1. One coat acrylic primer.
 - a. California: “Prime Choice 100% Acrylic Universal Primer”, N°. 50600.
 - b. Glidden Professional: Gripper Interior/Exterior Primer N°. 3210.
 - c. Moore: “First Coat”, N°. 216.
 - d. Pittsburgh: “Perma-Crete Acrylic Alkali Resistant Primer”, N°. 4-603.
 - e. Sherwin-Williams: “Lox-On Interior Acrylic Masonry Primer” B28 W300 Series.
 - 2. Two coats acrylic semi-gloss paint:
 - a. California: “Fres-Coat Unite 100% Acrylic Latex Semi-Gloss”, N°. 563.
 - b. Glidden Professional: Ultra-Hide 250 Semi-Gloss N° 1406.
 - c. Moore: “Superspec Latex Semi Gloss”, 276 Series.
 - d. Pittsburgh: “Speedhide”, 6-500 Series.
 - e. Sherwin-Williams: “ProMar 200 Latex Semi-Gloss”.
- C. Interior CONCRETE MASONRY walls and partitions:
 - 1. One coat block filler:
 - a. California: “Mason-Cote 100% Acrylic Latex Block Filler”, N°. 3751.

- b. Glidden Professional: Concrete Coatings Block Filler Interior/Exterior N°. 3010.
 - c. Moore: "Super Craft Latex Block Filler", N°. 285
 - d. Pittsburgh: "Speedhide Interior Masonry Latex Block Filler", 6-7 Series.
 - e. Sherwin-Williams: "PrepRite Int. Ext Block Filler", B25-W25 Series.
2. Two coats acrylic semi-gloss paint:
- a. California: "Fres-Coat Unite100% Acrylic Latex Semi-Gloss", N°. 563.
 - b. Glidden Professional: Ultra-Hide 250 Semi-Gloss N° 1406.
 - c. Moore: "Superspec Latex Semi Gloss", 276 Series.
 - d. Pittsburgh: "Speedhide", 6-500 Series.
 - e. Sherwin-Williams: "ProMar 200 Latex Semi-Gloss".
- D. Interior CONCRETE MASONRY walls and partitions to receive epoxy finish paint:
1. One coat block filler:
- a. California: "Mason-Cote 100% Acrylic Latex Block Filler", N°. 3751.
 - b. International "Interlac 895" at 55 to 75 square feet per gallon.
 - c. Devoe Coatings (wet areas): Tru-Glaze-WB 4015 Waterborne Epoxy Block Filler.
 - d. Devoe Coatings (dry areas): Bloxfil 4000 Heavy Duty Acrylic Block Filler.
 - e. Moore: "Latex Block Filler", N°. P88.
 - f. Pittsburgh: "Speedhide Int/Ext Acrylic Masonry Block Filler", 6-15 Series.
 - g. Sherwin-Williams: "PrepRite Int. Ext Block Filler", B25-W25 Series.
 - h. Tnemec "Series 130 - Envirofill" at 55 to 75 square feet per gallon.
2. Two coats epoxy paint.
- a. California: "Tile-Cote Polyamide Epoxy", N°. 12.
 - b. International "Intergard 735 WB".
 - c. Devoe Coatings: Tru-Glaze-WB 4428 Waterborne Epoxy Gloss Coating.
 - d. Moore: "Industrial Acrylic Epoxy Enamel", N°s. P43/P44.
 - e. Pittsburgh: "Pitt-Glaze Water Based Acrylic Epoxy Enamels", 16 Series.
 - f. Sherwin-Williams: "Water Based Catalyzed Epoxy", B70/B60V15 Series.
 - g. Tnemec "Series 113 - High-Build Theme Tufcoat".
- E. Interior underside of METAL DECKING, exposed to view joists, overhead steel, sprinkler piping, conduits, exterior surfaces of interior ducts and similar items:
1. Two coats waterborne acrylic dry fall finish:
- a. California: "Economy Latex Dry Fall Spray Flat", N°. 3701.
 - b. Glidden Professional: "Waterborne Dry Fall Flat N°. 1280".
 - c. Moore: "Sweep-Up Spray Latex Flat, N°. 153.
 - d. Pittsburgh: "Speedhide Latex Dry Fog Spray Paint", 6-714/715 Series.
 - e. Sherwin-Williams: "Waterborne Arcylic Dry Fall", B42 Series.
- F. Exposed to view portions of ducts, (interior side) at diffusers.

1. Two coats waterborne acrylic dry fall finish:
 - a. California: "Economy Latex Dry Fall Spray Flat", N°. 3701.
 - b. Glidden Professional: "Waterborne Dry Fall Flat N°. 1280".
 - c. Moore: "Sweep-Up Spray Latex Flat, N°. 153.
 - d. Pittsburgh: "Speedhide Latex Dry Fog Spray Paint", 6-714/715 Series.
 - e. Sherwin-Williams: "Waterborne Arcylic Dry Fall", B42 Series.
 - 1) Color: Flat black.

- G. Interior EXPOSED DUCTWORK, Insulated and Wrapped
 1. Apply one prime coat and two finish coats of a paint recommended by the approved paint manufacturer for application on the exposed wrapping material.

- H. Interior GYPSUM BOARD (drywall) partitions:
 1. One coat latex primer.
 - a. California: "Elements 100% Acrylic White Primer", N°. 74600.
 - b. Glidden Professional: "Lifemaster No VOC Primer N°. 9116".
 - c. Moore: "Eco Spec Interior Latex Primer Sealer", N°. 231.
 - d. Pittsburgh: "Pure Performance Interior Latex Primer", N°. 9-900.
 - e. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Primer, B28 Series."
 2. Two coats eggshell paint:
 - a. California: "Elements 100% Acrylic Zero VOC Eggshell", N°. 731.
 - b. Glidden Professional: "Lifemaster No VOC Eggshell N°. 9300".
 - c. Moore: "Eco Spec Interior Latex Eggshell", N°. 223.
 - d. Pittsburgh: "Pure Performance Eggshell", N°. 9-300.
 - e. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Eg-Shel", B20 Series.

- I. Interior GYPSUM BOARD (drywall) partitions, and ceilings, at toilet rooms, janitor's closets, food preparation and dishwashing areas or other areas not covered by other finishes for VOC compliant epoxy finish:
 1. One coat of sealer,
 - a. California: "Prime Choice ASAP Primer", N°. 50300.
 - b. Glidden Professional: "High-Hide Primer N°. 1000".
 - c. Moore: "SuperSpec Primer", N°. 253.
 - d. Pittsburgh: "Speedhide Interior Quick Drying Latex Sealer", 6-2 Series.
 - e. Sherwin-Williams: "Quick Drying Stain Blocking Primer," B51 Series.
 - f. Tnemec: PVA 51-792 Sealer.
 2. Two coats of semi-gloss Water Based Acrylic-Epoxy Coatings (3 mils DFT each coat).
 - a. California: No equivalent.

- b. Devoe Coatings: "Tru-Glaze-WB N°. 4428 Waterborne Epoxy Gloss Coating.
 - c. Moore: "Industrial Acrylic Epoxy Enamel", N°. P43/P44.
 - d. Pittsburgh: "Pitt-Glaze Water Based Acrylic Epoxy Enamels", 16 Series.
 - e. Sherwin-Williams: "Water Based Catalyzed Epoxy" B70/B60V15 Series.
 - f. Tnemec: "Tneme-Tufcoat", N°. 112.
- J. Interior GYPSUM BOARD (drywall) ceilings and underside of soffits:
- 1. One coat latex primer.
 - a. Basis of Design: California: "Envirotech 646xx".
 - b. Glidden Professional: "Lifemaster No VOC Primer N°. 9116".
 - c. Moore: "Eco Spec Interior Latex Primer Sealer", N°. 231.
 - d. Pittsburgh: "Pure Performance Interior Latex Primer", N°. 9-900.
 - e. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Primer", B28 Series.
 - 2. Two coats eggshell paint:
 - a. Basis of Design: California: "Envirotech 735xx".
 - b. Sherwin Williams: "ProMar 200 Zero VOC Latex Eg-Shel," B20 Series.
- K. Interior METAL, ALUMINUM, shop primed and previously painted (includes counter supports):
- 1. Touch up bare metal with latex metal primer.
 - a. California: "Rust-Stop DTM Primer/Finish", N°. 1061.
 - b. Devoe Coatings: Devflex 4020PF DTM Primer and Flat Finish.
 - c. Moore: "Metal Primer", N°. P04.
 - d. Pittsburgh: "Pitt-Tech DTM Primer/Finish 100% Acrylic", 90-709/712 Series.
 - e. Sherwin-Williams: "DTM Acrylic Primer Finish", B66 W1 Series.
 - 2. Two coats acrylic semi-gloss enamel:
 - a. California: "Rust-Stop DTM Primer/Finish", N°. 1061.
 - b. Devoe Coatings: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
 - c. Moore: "Super Spec HP DTM Semi-Gloss Enamel", N°. P29.
 - d. Pittsburgh: "Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel", 90-1210 Series.
 - e. Sherwin-Williams: "Sher-Cryl HPA Semi-Gloss", B66 Series.
- L. Interior METAL, FERROUS, excluding railings, to receive satin finish: (includes galvanized metal doors and frames):
- 1. One coat of rust prohibitive primer for unfinished metal surfaces, and touch up bare metal at shop primed, existing and previously coated surfaces:
 - a. California: "Rust-Stop DTM Primer/Finish", N°. 1061.
 - b. Glidden Professional: "Devflex" N°. 4020 DTM Flat WB Primer/Finish.

- c. Moore: "Acrylic Metal Primer", N°. P04.
 - d. Pittsburgh: "Pitt-Tech DTM Primer/Finish 100% Acrylic", 90-709/712 Series
 - e. Sherwin-Williams: "Pro-Cryl Primer," B66 Series.
 - 2. Two coats acrylic satin enamel:
 - a. Glidden Professional: "Devflex 4216HP Satin DTM WB Acrylic Enamel".
 - b. Moore: "Super Spec HP DTM Satin Enamel", N°. P29.
 - c. Pittsburgh: "Pitt-Tech Plus High Performance, Satin DTM Industrial Enamel", 90-1210 Series.
 - d. Sherwin-Williams: "Pro Industrial DTM Satin", B66 Series.
 - 3. NOTE: Confirm compatibility of proposed coatings at exposed to view structural steel with intumescent fireproofing.
- M. Interior METAL, GALVANIZED, (includes exposed ductwork):
- 1. Touch-up with metal primer.
 - a. California: "Rust-Stop DTM Primer/Finish", N°. 1061.
 - b. Glidden Professional: "Devflex" N°. 4020 DTM Flat WB Primer/Finish.
 - c. Moore: "Acrylic Metal Primer", N°. P04.
 - d. Pittsburgh: "Pitt-Tech DTM Primer/Finish 100% Acrylic", 90-709/712 Series.
 - e. Sherwin-Williams: "Pro-Cryl Primer," B66 Series.
 - 2. Two coats acrylic semi-gloss enamel:
 - a. California: "Rust-Stop DTM Primer/Finish", N°. 1061.
 - b. Glidden Professional: "Devflex 4216HP Semi-Gloss DTM WB Acrylic Enamel".
 - c. Moore: "Super Spec HP DTM Semi-Gloss Enamel", N°. P29.
 - d. Pittsburgh: "Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel", 90-1210 Series.
 - e. Sherwin-Williams: "Pro Industrial DTM Semi-Gloss," B66 Series.
- N. Interior exposed METAL, PIPING: Same as specified for ferrous metal.
- O. Interior METAL, RAILINGS (handrails and guardrails):
- 1. One coat of epoxy primer (dry film coat 3.0 to 4.0 mils)
 - a. California: No equivalent.
 - b. Glidden Professional: "Tru-Glaze B" N°. 4030 Epoxy Primer.
 - c. Moore: "Epoxy Metal Primer", P33 Series.
 - d. Pittsburgh: "Aquapon WB Epoxy Primer", 98 Series
 - e. Sherwin-Williams: "Recoatable Epoxy Primer", B67 Series.
 - 2. Two coats of gloss finish epoxy coating (dry film coat 1.5 to 2.0 mils).
 - a. California: "Tile-Cote Polyamide Epoxy", N°. 12.
 - b. Glidden Professional: "Tru-Glaze B" No. 4408 Epoxy Primer.
 - c. Moore: "Acrylic Epoxy Gloss Coating", N°s. P43/P44.

- d. Pittsburgh: "Aquapon WB Epoxy Coatings", 98 Series.
 - e. Sherwin-Williams: "Hi-Solids Polyurethane-Low VOC, B65 Series".
- P. Interior WOOD, PLYWOOD TRIM and PANELS, unfinished, to receive painted (opaque) finish:
- 1. One coat acrylic primer-sealer (undercoater):
 - a. Glidden Professional: "Prep and Prime Wall and Woodwork Acrylic Wood Undercoater", N° 1020-1200.
 - b. Moore: "Alkyd Enamel Underbody", N°. 217.
 - c. Pittsburgh: "Speedhide Alkyd Interior Quick-Drying Enamel Undercoater", 6-6 Series.
 - d. Sherwin-Williams: "Premium Interior Wall and Wood Primer", B28 Series.
 - 2. Two coats acrylic semi-gloss enamel:
 - a. California: "Fres-Cote Semi-Gloss", N°. 563.
 - b. Glidden Professional: "Ultra Hide" N°. 1416xxxx Semi-Gloss.
 - c. Moore: "Superspec Latex Semi Gloss", 276 Series.
 - d. Pittsburgh: "Speedhide Interior Semi-Gloss", 6-500 Series.
 - e. Sherwin-Williams: "Solo 100% Acrylic Interior Exterior Semi-Gloss," A76 Series.
- Q. Interior WOOD TRIM, unfinished, to receive clear polyurethane (water-based) finish.
- 1. One coat paste wood filler for open-grained woods.
 - a. California: No equivalent.
 - b. Glidden Professional: No equivalent..
 - c. Moore: "Benwood Paste Wood Grain Filler", N°. 238.
 - d. Pittsburgh: No equivalent.
 - e. Sherwin-Williams: "SherWood Paste Filler", D70T1 Series.
 - 2. Two coats of satin-gloss (low luster) finish clear water-based polyurethane
 - a. Cabot: Water-based Polyurethane Varnish - Satin" No. 2201.
 - b. California:
 - c. Glidden Professional: Woodpride Water-Based Varnish Satin N°. 1802.
 - d. Moore: "Benwood Clear Acrylic Polyurethane Finish - Low Lustre", N°. 423.
 - e. Pittsburgh: Olympic Interior Water Based Polyurethane", N°. 42386.
 - f. Sherwin-Williams: "Wood Classics Waterborne Polyurethane Varnish – Satin", A68 Series.
- R. Interior TEMERED HARDBOARD stage flooring to receive epoxy finish:
- 1. One coat epoxy:
 - a. Sherwin-Williams: "General Polymers 3555", Epo-Flex HD Epoxy Series.
 - b. California:
 - c. International:

- d. Devoe Coatings:
 - e. Moore:
 - f. Pittsburgh:
 - g. Tnemec: .
2. One coat epoxy:
- a. Sherwin-Williams: "General Polymers "3746", High Performance Series.
 - b. California:
 - c. International:
 - d. Devoe Coatings:
 - e. Moore:
 - f. Pittsburgh:
 - g. Tnemec: .
3. One coat urethane:
- a. Sherwin-Williams: "Aquarmor WBU", Water Based Urethane Series.
 - b. California:
 - c. International:
 - d. Devoe Coatings:
 - e. Moore:
 - f. Pittsburgh:
 - g. Tnemec: .

1.3 PAINTING SCHEDULE FOR FIRE RESISTIVE AND RATED DESIGNATIONS

- A. In compliance with Massachusetts State Building Code, Ninth Edition (referencing the 2015 International Building Code) and as additionally specified herein, provide identification for all fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions and any other wall or partition which is required to have protected openings or penetrations.
1. Application:
- a. Apply to outside of fire rated shafts, and to both sides of partitions at intervals not to exceed 30'-0" for entire length of partition or wall, or once on any partition 30'-0 feet or less in length.
 - b. Locate identification in all accessible concealed floor, floor-ceiling and attic spaces. Locate identification within 12 to 18 inches above finished ceilings.
 - c. Apply stenciled lettering by spray or brush, or provide permanent signage. Identification shall be waterproof, fade-proof and non-combustible. Signage shall be mechanically fastened or permanently adhered to partition.
 - d. Stencil character height: 1 inch minimum.
 - e. Color: Easily identifiable color, contrasting with background, acceptable to Owner.
2. Apply stenciled lettering to the following types of partitions using wording specified:

- a. Applied identification for 3 hour fire rated partitions shall read: "3 HOUR FIRE WALL - PROTECT ALL OPENINGS".
- b. Applied identification for 2 hour fire rated partitions shall read: "2 HOUR FIRE WALL - PROTECT ALL OPENINGS".
- c. Applied identification for 1 hour fire rated partitions shall read: "1 HOUR FIRE WALL - PROTECT ALL OPENINGS".
- d. Applied identification for Smoke barriers shall read: "1 HOUR SMOKE BARRIER - PROTECT ALL OPENINGS".
- e. Applied identification for Smoke partitions shall read: "SMOKE BARRIER PARTITION - PROTECT ALL OPENINGS".

1.4 PAINTING SCHEDULE FOR MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black enamel.
- B. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- C. Remove unfinished louvers, grilles, covers and access panels on and paint as scheduled above.
- D. Plywood backboards for electrical panels and other equipment. Paint both front and back surfaces and all edges of plywood backboards before backboards are installed.
 - 1. One coat latex primer-sealer (undercoater):
 - a. Glidden Professional: "Prep & Prime Odor-Less Interior Water-Based Primer-Sealer" LM 9116.
 - b. Moore: "EcoSpec Interior Latex Primer Sealer" 231.
 - c. Pittsburgh: "Pure Performance Interior Latex Primer".
 - d. Sherwin-Williams: "ProMar 200 Zero VOC Interior Latex Primer," B28 Series.
 - 2. Two coats latex semi-gloss paint:
 - a. Glidden Professional: "Lifemaster 2000 Interior Semi-gloss" LM9200.
 - b. Moore: "EcoSpec Interior Latex Semi-gloss" N°. 224.
 - c. Pittsburgh: "Pure Performance Interior Semi-gloss", 9-500 Series.
 - d. Sherwin-Williams: "ProMaro 200 Zero VOC Semi-Gloss," B31 Series.
- E. Prime and paint insulated and exposed cold pipes, conduit, electrical boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are located in storage, mechanical or equipment spaces or those items which are factory prefinished.
- F. Exposed to view un-insulated hot pipes within finished painted areas: Two coats heat-resistant enamel conforming to Federal Specification TT-E-496, Type I, applied when surfaces are less than 140 degrees Fahrenheit.

End of Document

Section 10 11 16
MARKERBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Markerboards with magnetic surface.
 - 2. Tackrails.
 - 3. Tackboards.
 - 4. Trim, marker tray, magnets, and accessories.
 - 5. Prefabricated wall mounted aluminum display case cabinets.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.

- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.

- E. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.

- F. Section 09 29 00 - GYPSUM BOARD: Gypsum board substrate.

- G. Section 09 84 00 – ACOUSTICAL ROOM COMPONENTS: Fabric wrapped acoustic wall panels.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES.
1. ASTM A 424 - Steel Sheets for Porcelain Enameling.
 2. ASTM B 209 - Aluminum-Alloy Sheet and Plate.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets for each item furnished hereunder.
 2. Selection samples: Manufacturer's sample chain showing finishes and colors available, for both dry-marker boards, for selection by Architect.
 3. Selection samples: Manufacturer's fabric selection for tackboard covering.
 4. Provide maintenance information on regular cleaning and stain removal for marker boards.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.

2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
 - B. Storage and Handling Requirements:
 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - C. Packaging Waste Management: Comply with disposal and recycling requirements specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
 - D. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.
- 1.6 WARRANTY
- A. Provide manufacturer's standard 5 year warranty which shall include coverage of dry-marker board surfaces from discoloration due to cleaning.
- 1.7 MAINTENANCE
- A. Provide maintenance information on regular cleaning, stain removal for dry-marker boards.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Claridge Products & Equipment Inc., Harrison AR.
 2. Ghent Corporation, Lebanon OH.
 3. Marsh Industries, Inc., New Philadelphia, OH.

2.2 MARKERBOARD

- A. Magnetic markerboard surfaces:
 1. Porcelain enamel writing surface, equal to Claridge LCS-3:
 - a. Bottom ground coat: 1.5 to 2.2 mils.
 - b. Top ground coat: 2.0 to 2.8 mils.
 - c. Color coat: 3.0 to 4.0 mils.
 - d. 5 foot high seamless units.
 2. Face sheet color: As selected by the Architect.

3. Core material for laminated construction: 7/16 inch fiberboard core.
 4. Backing sheet: Aluminum or steel sheet, minimum 0.015 inch thick.
 5. Exposed trim: Extruded 6063-T5 alloy aluminum, anodized, satin finished.
- B. Factory applied silk screened fused-on porcelain graphics at Music rooms:
1. Music staff lining: 1/8 inch lines, 1-1/2 inch on centers with 5 inches between staffs. 48 inch high by width indicated on Drawings.
- C. Tackboard surfaces: Self-healing, fabric-covered ¼ inch thick natural cork laminated to ¼ inch thick fiberboard.
1. Fabric: Basis of design: Guilford of Main FR701 Style 2100. Provide in 6 colors as selected, 2-1/2 foot high seamless units.
- D. Marker tray: Manufacturer's standard continuous box type aluminum marker tray with slanted front and cast plastic end closures for each markerboard. Extend marker tray full width of markerboard or markerboard/tackboard combination.

2.3 DISPLAY CASES

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Claridge Products and Equipment, Inc., product "Imperial Series".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Claridge Products and Equipment, Inc.
 2. Greensteel, Inc.
 3. Poblocki & Sons, Inc.
 4. ABC Bulletin & Directory Division of Nelson Harkins.
- C. Display cases: Satin anodized aluminum framed display case with 3/16 inch thick sliding glass doors with integral finger pulls and key tumbler lock complying with the following:
1. Size: 4 feet high by 5 feet wide by 1-1/2 inch clear inside depth.
 2. Back panel: Tackable surface equal to Claridge "Fabricork".
 3. Mounting: Concealed "Z" clip.
 4. Finish: Satin anodized aluminum.

2.4 ACCESSORIES

- A. Provide sliding aluminum accessories, hook type, to fit display rail.
1. Provide two sliding aluminum map supports for every 8 linear feet of marker board.
 2. For each room provide one flag holder.
 3. For each room provide two roller map brackets.
- B. Provide instructions for dry erase marker board cleaning on metal plate attached to perimeter frame near marker trough.

- C. Magnets as supplied by the manufacturer:
 - 1. Neodymium disc magnets, 0.125 inch thick by 0.75 inch diameter magnets in steel holders.
 - a. Provide (10) multi-color magnets per marker board.
- D. Tack strip:
 - 1. Aluminum channel/display rail, 2 inches high.
 - 2. Cork inserts.
 - 3. Provide hooks 6 feet on center.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and internal wall blocking are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing substrate.

3.2 INSTALLATION

- A. Install markerboards and tackboards in accordance with manufacturer's instructions. Protect porcelain enamel facing from chipping and damage during handling and installation. Install units level and plumb utilizing concealed continuous hangers wherever possible and where fasteners must be exposed, use tamperproof-type fasteners.
- B. Coordinate installation with interactive projector specified in Section 21 41 30 - VISUAL DISPLAY BOARDS

3.3 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover boards with protective cover taped to frame. Remove cover on Date of Substantial Completion.

End of Section

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Section 10 11 53
RECESSED DISPLAY ENCLOSURES

PART 1 – GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. LCD/Plasma display enclosures.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Division 26 - ELECTRICAL: Electrical connections for lighting and data/power outlets.
- E. Division 27 - COMMUNICATIONS: Cable connections for displays.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequencing:
 - 1. Field Measurements
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

- b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets and specifications, for each product installed and furnished hereunder clearly indicating configurations, sizes, materials, finishes, locations, utility connections and locations. Include information on accessories and options.
 - 2. Manufacturer's installation instructions: Indicate special procedures, perimeter conditions and conditions requiring special attention.
 - 3. Manufacturer's certificates: Certify that Products provided under this Section meet or exceed UL and specified requirements.
 - 4. Manufacturer's sample warranties.
 - 5. Shop drawings for coordination: Provide dimensioned locations for utility connections.
 - 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.6 REGULATORY REQUIREMENTS

- A. Products requiring electrical connections: Listed and classified by UL, as suitable for the purpose specified and indicated.
- B. Provide and install the work of this Section in conformance with all applicable federal, state and municipal codes, laws and regulations regarding utilities, health, fire protection and safety.

1.7 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.
 - 1. UL standards: Provide equipment with UL labels.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
- B. Storage and Handling Requirements:
1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
- C. Packaging Waste Management: Comply with disposal and recycling requirements specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- D. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.
- 1.9 WARRANTY
- A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Insight PC Enclosures, Midvale, UT, Product: "85" Recessed Guardian and 55" Recessed Guardian"
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Insight PC Enclosures, Midvale, UT.
 2. ItsEnclosures, Mt. Pleasant, PA.
 3. ProEnc, Jersey City, NJ.

2.2 DESCRIPTION

- A. General Description: Powder coated steel enclosure with shatterproof tempered glass window, mounting brackets, security bolts, fan and filter system with louvers (85 inch enclosure only), keyed compression locks and rubber grommets at cable entry points. Key all locks alike.

2.3 FABRICATION

- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

2.4 FINISHES

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. TIGER Drylac, Reading PA.
 2. PPG Powder Coatings Division, Pittsburgh PA.
 3. Powder Technology, Inc., Schofield, WI.
- B. Preparation;
1. Clean surfaces by shot blasting. Blast using a media that will result in a target 1.5 – 2.5 mil surface profile. SSPC SP7 Brush Off Blast Cleaning Minimum.
 2. Grinding of Surface Defects. Any remaining surface defects after shot blasting should be ground and the immediate area air blasted.
 3. Apply finish coating manufacturer's recommended epoxy primer.
 4. Powder coating epoxy coating, as manufactured by TIGER Drylac, Reading PA, Product Special Series 49 in smooth Low-Semi-Gloss finish or approved equal.
 - a. Film Thickness: 2.5-3.5 mils, dry film thickness.
 - b. Gloss: 36-54° (per gardener 60°, ASTM D523).
 - c. Cross hatch adhesion test (per ASTM D3359): rated 5B.
 - d. Mandrel bending test (per ASTM D522) 5mm (3/16 inch).
 - e. Impact test (per ASTM D2794), Up to 120 in-lb.
 - f. Pencil Hardness (ASTM B3363) 2H (minimum).
 - g. Humidity resistance, maximum blistering (1500 hours, ASTM D2247): 1 mm (0.04 inch).
 - h. Acid salt spray resistance, maximum undercutting (1500 hours, ASTM G85): 1 mm (0.04 inch).
 5. Minimum Film Thickness, Finish Coat: 2.5-3.5 mils, dry film thickness.
 6. Color: Custom color to match Architect's control sample.
 7. Field touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify the Contractor, and copy to Architect, in writing of any

conditions detrimental to the proper and timely completion of the work, and do not proceed with the work until said conditions are corrected.

- B. Verify clearances required for equipment.
- C. Verify ventilation outlets, service connections, and supports are correct and in required location.
- D. Verify that electric power is available and of the correct characteristics.
- E. Beginning of installation means acceptance of existing site conditions.

3.2 INSTALLATION

- A. Install each product in accordance with manufacturers' instructions.
 - 1. Maximum variation for installed equipment, from true position of 1/16 inch in 8 feet for plumb and level and a maximum of 1/32 inch offsets in adjoining surfaces intended to be flush.
- B. Sequence installation and erection to ensure correct electrical and communications connections are achieved.
- C. Anchor equipment using devices appropriate for equipment, substrate and expected usage.

3.3 ADJUSTING

- A. Adjust work under provisions of Section 01 73 00 - EXECUTION.
- B. Adjust equipment to ensure proper working order and conditions.
- C. Remove and replace equipment creating excessive noise, or vibration.
- D. After installation is completed, insure that operating parts work freely and fit neatly. Adjust hardware and catches. Repair or replace damaged parts dents, buckles, abrasions, scraps or other damage affecting the appearance or serviceability.

3.4 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- B. Clean work under provisions of Section 01 70 00 – EXECUTION.
- C. Waste Management:
 - 1. Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
 - 2. Dispose of liquid waste in accordance with all applicable regulations. Consult all regulations (federal, provincial, state, local) or a qualified waste disposal firm when characterizing waste for disposal. Contact manufacturer for MSDS sheets for product information, and recommendations for proposal disposal.

Utilize licensed waste disposal companies as may be required, the following phone numbers for national companies are provided for the Contractor's convenience only.

- a. Safety Kleen, Plano TX., (telephone 800-669-5740).
- b. Clean Harbors, Norwell MA., (telephone 800-422-8998).
- c. Phillip Services Corporation (PSC), Houston TX., (telephone 800-726-1300).

3.5 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

Section 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following informational and directional signage:
1. Interior Room signage:
 - a. Primary room signage: Photopolymer AAB-compliant room signage adhered with double sided acrylic foam tape, typical at all permanent spaces (including but not limited to Classrooms, Science Labs/Prep Rooms, Offices, Meeting Rooms, Vocational Shops, Gymnasium/PE spaces, Locker Rooms, Media Center, Auditorium/Stage, Kitchen/Cafeteria and related Food Services spaces, Medical spaces, Pre-K/Day Care spaces, ROTC spaces, Building Services spaces, Storage Rooms and Toilet Rooms); with removable name holder slot; 0.16 inch thick, with backed acrylic polyurethane enamel paint, and raised Braille cells.
 2. Interior Egress signage:
 - a. Photopolymer AAB-compliant room signage; 8 inch by 8 inch; adhered with double sided acrylic foam tape, typical at all permanent spaces (including but not limited to Classrooms, Science Labs/Prep Rooms, Offices, Meeting Rooms, Vocational Shops, Gymnasium/PE spaces, Locker Rooms, Media Center, Auditorium/Stage, Kitchen/Cafeteria and related Food Services spaces, Medical spaces, Pre-K/Day Care spaces, ROTC spaces, Building Services spaces, Storage Rooms and Toilet Rooms); with slot for 8.5" x 11" egress floor plan.
 - b. Raised character and braille exit signage: Photopolymer AAB-compliant room signage; 8 inch by 8 inch; adhered with double sided acrylic foam tape, typical at the following locations:
 - 1) Exit stairways and ramps.
 - 2) Exit passageways.
 - 3) Exit discharge.
 - 4) Mounting: 4 feet 6 inches above finished floor on latch side of each door.
 3. Interior Directional/Wayfinding signage:
 - a. Photopolymer AAB-compliant directional signage
 - b. Quantity: Fifty (50) 12" by 18" inch plaques.
 4. Maximum occupant load sign at every space for use as a place of public assembly, designated as an "A" Occupancy Type on the Drawings, 8 inch by 8 inch. Location of sign to be reviewed and approved by Architect.
 5. Exterior signage:
 - a. Cast aluminum individual letters at front/rear building entries and at Apricot Street school sign; refer to Drawings.
 - b. Die-cut vinyl letters/numbers for identification of all exterior doors.
 6. Dedication plaque.

7. Hazardous material signage complying with NFPA 704 at A334 Chemical Storage, B024 Storage, B029 Storage and B036 Storage.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: Temporary project sign and safety signage.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 06 10 00 – ROUGH CARPENTRY: In-wall blocking.
- G. Division 32 - EXTERIOR IMPROVEMENTS: Traffic and parking control signage, site school sign.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, physical properties for each item furnished hereunder.
 2. Schedule: The Architect will prepare and issue a schedule for all identification devices to be furnished hereunder, including character types, and colors. .After receipt of the Architect's schedule, prepare and submit shop drawings and verification schedule.
 3. Shop drawings:
 - a. Plan drawing showing location of each interior and exterior sign. Coordinate plan with schedule.

- b. Elevation drawings showing full size elevations of each sign. Indicate for each sign: sign styles, lettering and locations, and overall dimensions.
- c. Large scale design details of signs, showing attachment clips and brackets; and complete installation details.
- 4. Selection samples:
 - a. Sample plastic chips indicating Manufacturer's full range of colors available for initial selection by Architect.
- 5. Verification samples:
 - a. Full size sample sign, of type, style and color specified including method of attachment.
 - b. Full size stainless steel letter in specified size, finish and typeface, with mounting collar and stud.
 - c. Full size sign in specified finish and typeface. Approved sample may be used in finished Project.
- 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.4 REGULATORY REQUIREMENTS

- A. Comply with all applicable federal, state and municipal codes, laws and regulations regarding signage, both interior and exterior.

1.5 QUALITY ASSURANCE

- A. Sign fabricator specializing in the work of this Section with a minimum of 3 years experience.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivered packaged signs, labeled in name groups.
- B. Store all materials in an elevated dry location, protected by waterproof coverings. Store adhesive tape at ambient room temperature.

1.7 ENVIRONMENTAL CONDITIONS

- A. Do not install adhesive applied signs when ambient temperature is below 70 degrees Fahrenheit. Maintain this minimum during and after installation of signs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Interior plaque signs:
 - a. Apco New England, Franklin, MA.
 - b. Design Communications, Boston, MA.
 - c. Sunshine Sign, North Grafton, MA.
 - d. General Sign Company, Norwood, MA.
 - e. Back Bay Sign Company, Somerville, MA.
 - 2. Individual letter signage:
 - a. ARK Ramos, Oklahoma City, OK.
 - b. Gemini Inc., Cannon Falls, MN
 - c. Matthews International Corporation, Pittsburgh, PA
 - d. Metal Arts, Mandan, ND.

2.2 SIGNAGE - GENERAL

- A. General: Provide sign copy to comply with the requirements indicated in the Drawings, for sizes, styles, spacing, content, positions, materials, finishes and colors of letters.
 - 1. All Signs shall conform to United States "*Americans with Disabilities Act*" and Commonwealth of Massachusetts Regulation 521 CMR: *Architectural Access Board*.
 - 2. Final placing, (mounting heights) and sizing of lettering shall be in full compliance with 521 CMR requirements. Lettering shall have stroke width to height ratio and width to height ratio in accordance with the "*Americans with Disabilities Act*".
- B. Installation of all signs shall be done by vandal-proof method, fully described on the shop drawings.

2.3 INTERIOR ROOM SIGNAGE

- A. Photopolymer plaque signage (general requirements): Identification signs with raised tactile graphics, text, and Grade 2 Braille. Signs shall consist of 1/32 inch thick synthetic light sensitive photo emulsion permanently bonded to a rigid phenolic substrate, aluminum or acrylic plaque.
 - 1. Room signage as follows:
 - a. 8 inches by 6 inches for room signs with removable name holder slots (Teaching spaces, offices and other similar locations).
 - b. 8 inches by 4 inches for all other signs except as indicated.
 - c. 8 inches by 8 inches for room signs with pictograms.

2. Raised lettering: Minimum above the surface of the sign 1/32", and be in compliance with Americans with Disabilities Act.
 - a. Bond photopolymer permanently to sign plaque, with appropriate laminating film, as recommend by the photopolymer manufacturer.
3. Lettering height: To be determined.
4. Lettering font: To be determined.
5. Screenprinting: All screen printing graphics, including raised areas of tactile plaques except Braille, shall be screen printed in a contrasting color so as to meet the color contrast requirements of Americans with Disabilities Act.
 - a. All non-tactile text shall be screen printed with catalyzed epoxy ink. Applied vinyl lettering and graphics is not acceptable.
 - b. Apply screen printing inks evenly without pinholes, scratches or orange-peeling.
6. Graphics: All text, symbols and graphics shall be reproduced utilizing computer generated digital art. All screen printed graphics shall utilize photographically prepared screens and shall be printed in accordance with industry standards. Hand cut screens are not acceptable.
 - a. All edges and corners and letter forms shall be true and clean. Letterforms, color areas, or lines with rounded positive or negative corners, built-up edges, bleeding, spattering, etc., shall not be accepted.
 - b. Prepare artwork from typesetters reproduction of the test specified, minimum 1200 dpi resolution, camera ready artwork. All camera ready artwork and typesetting shall be no less than 75 percent of actual finished size.
7. Mounting: Surface applied by means of silastic adhesive mounting. Provide back panel at all glass mounted locations.
8. Sign colors: As selected by Architect from manufacturer's standard and standard special colors.
 - a. All signs shall be two color signs.
9. Allow one room identification sign for every room entry door on the plans.
10. Refer to Drawings for designs and Sign Schedule.

2.4 DIRECTIONAL SIGNAGE INTERIOR

- A. Directional signage, (photopolymer plaque signage): Upper and lower case letters. Signs shall be 18 inches in width by 30 inches in height, with square corners and raised frame.
 1. Provide 3 signs for each the following identifications, locate where directed.
 - a. First Floor locations:
 - b. Second Floor locations:
 - c. Third Floor locations:
- B. Photopolymer plaque signage with raised tactile graphics and adhesive mounting.

2.5 DEDICATION PLAQUE

- A. Plaques:

1. Letterform: Initial capitals, normal spacing with font directed by Architect.
2. Finish: Enamel background with color to match Architect's sample.
3. Copy: To be issued; the plaques will include the following:
 - a. Name of Building.
 - b. Names of City Councilors.
 - c. Names of Building Committee members.
 - d. Name of Architect.
 - e. Name of Construction Manager.
 - f. Dedication statement of approximately 500 characters.
 - g. Time Capsule statement of approximately 100 characters.
4. Mounting: Flush, mechanically fastened on interiors
5. Edge: Raise bevel edge at entire perimeter.
6. Background Texture: Pebble leather grain.
7. Metal: Stainless steel.
8. Size: 24 inches by 30 inches, raised letter stainless steel plaque.
9. Beveled edge raised with reveal line.
10. Concealed post mounting.
11. Text content: As determined by the Architect.

2.6 SIGNAGE AT EXTERIOR DOOR FRAMES

- A. Signage at exterior door frames: Provide individual lettering mounted at the top center portion of each exterior door frame, both on the exterior and interior sides.
 1. Door frame signage, (At interior side of exterior doors): Adhesive mounted photopolymer plaque signage.
 2. Door frame signage, (At exterior side of exterior doors): Die-cut copy characters, from opaque non-reflective cast vinyl film, with pressure sensitive adhesive backing.
 - a. Letterform: 1 inch high, upper case, normal spacing with font directed by Architect.

2.7 ACCESSORIES

- A. Exposed mounting hardware: Stainless steel tamper resistant screws.
- B. Adhesive tape: Double sided tape, permanent adhesive.
- C. Anchors and inserts for stainless steel letters:
 1. Stainless steel collars, finished to match letter edges.
 2. Mounting studs: Threaded type 304 stainless steel studs.
- D. Fasteners for interior aluminum plate signage: N°. 6 stainless steel wood screws, round head.

2.8 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, related to appearance. Color provided by the Architect.
- B. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations.
- C. Stainless steel finish: ASTM A666, Type 304 stainless steel with satin finish.
- D. Aluminum Finishes: Finish designations prefixed by AA conform to the system established by the Aluminum Association for designation aluminum finishes.
 - 1. Class II Clear Anodized Fine Satin Finish: AA-M31C21 A31 (Mechanical Finish: Fine satin direction textured' Chemical Finish: Fine matte etched finish' Anodic Coating,
- E. Paints: Paint for signs is acrylic polyurethane enamel, eggshell finish. Paint for background of tactile photo-polymer signs is eggshell finish automotive grade lacquer. All surfaces shall be cleaned, primed and pre-treated according to the manufacturer's specifications and noted in Shop Drawings as part of the finished surface work.
- F. Inks:
 - 1. Inks for metal signs, glass and wall surfaces are Alkyd enamel based inks.
 - 2. Inks for plastic signs are lacquer based inks.
 - 3. Inks for tactile graphics on photo-polymer signs are eggshell finish Low Odor Vinyl Ink.
 - 4. Inks for filling acid-etched graphics in metal signs are semi-gloss epoxy ink.
 - 5. All inks and paints are evenly applied without pin-holes, scratches or application marks. Prime coats or other surface pre-treatments, where recommended by the manufacturers are included in the work and noted in the shop drawings as part of the finished surface work.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Locate sign units and accessories where indicated, locations in accordance with the approved shop drawings. Use mounting methods of the type described and in compliance with manufacturer's instructions.
- B. Install signs plumb, level and true to height indicated, with sign surfaces free from distortion or other defects in appearance.
- C. Shop fabricate signs where practical and deliver to site completely assembled. All joints of such fabricated work are completely smooth without apparent marks showing throughout the finish. All work "broken down" is erected so that all parts fit accurately with hairline joints, with all joints flush. Joints in lighted signs shall be light-proof.

- D. Wall and door mounted signs; All sign plaques mounted at glass door locations shall be backed with plaque of same size, thickness, material and color on opposite side to mask mounting adhesive.
 - 1. Attach to surfaces as follows:
 - a. Vinyl Tape Mounting: Use very high bond, double sided foam tape, of thickness indicated, to mount signs to smooth nonporous surface. Use construction adhesive in conjunction with foam tape.
 - b. Silicone Adhesive Mounting: Use appropriate liquid silicone adhesive to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape to hold the sign in place until the adhesive has fully cured.
 - E. Dimensional Letters and Numbers: Mount letters and numbers using threaded studs, foam tape and construction adhesive as indicated in the detail drawings. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.
- 3.2 CLEANING
- A. Clean and polish installed signs.
 - B. Upon completion of the work of this Section in any given area, remove tools and all rubbish and debris from the work area; leave area in broom-clean condition.
 - C. Remove all names, stamps and decals of sign manufacturers, and installers. No visible advertising of any kind is permitted.
- 3.3 SCHEDULES
- A. Signage: nominal 8 by 8 inch size sign, having 1-1/2 inch high letters, identifying the room number and Braille strip; verify mounting locations with Architect.
 - B. At each door to the following room types, provide sign, having 1-1/2 inch high letters identifying room label, a maximum of 2 lines of copy, and Grade 2 Braille strip.
 - 1. Janitor's Closets.
 - 2. Elevator Machine Room.
 - a. Elevator Machine Room signage shall be in full compliance with the Massachusetts Comprehensive Fire Safety Code (527 CMR).
 - 3. Electrical and Telephone closets.
 - 4. Sprinkler Valve Room.
 - 5. Equipment and Mechanical Rooms.
 - C. At toilet room doors: provide: nominal 8 by 8 inch size sign, having 3 inch high international symbol for men/women (as appropriate) beneath provide 5/8 inch high text "MEN", "WOMEN" or "TRANSGENDER" (as appropriate), raised 1/32 inch and a Grade 2 Braille strip.
 - 1. Provide international handicap symbol.

End of Section

Section 10 14 53
TRAFFIC SIGNAGE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
1. Manufacture of Signs
 2. Installation of Signs and Sign Posts
- B. Alternates: Not Applicable.
- C. Items to Be Installed Only: Not Applicable.
- D. Items to Be Furnished Only: Not Applicable.
- E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 32 12 16 – ASPHALT PAVING for placement of curbing (sloped granite, vertical granite, and Cape Cod berm) and paving of roadways and parking lots.
 2. Section 32 13 13 – CONCRETE PAVING for installation of cement concrete paving for driveways and sidewalks.
 3. Section 32 92 00 – LAWNS for installation of grassed lawns.
 4. Section 03 30 00 – CAST-IN-PLACE CONCRETE for Portland cement concrete requirements.

1.3 SUBMITTALS

- A. Refer to SECTION 01 33 00 – SUBMITTALS for submittal provisions and procedures.
1. The shop drawing submittals for the signs and posts shall clearly show materials, layouts, sizes, finishes, supports, foundations, connections, and relationship to driveway/curb line.

1.4 REFERENCE STANDARDS

- A. The following standards are applicable to the work of this Section to the extent referenced herein:

1. Commonwealth of Massachusetts, Massachusetts Highway Department (MHD), Standard Specifications for Highways and Bridges, latest English Edition with amendments, hereinafter referred to as the "Standard Specifications." All references to method of measurement, basis of payment and payment items in the Standard Specifications are hereby deleted. References made to particular sections or paragraphs in the Standard Specifications shall include all related articles mentioned therein.
2. Commonwealth of Massachusetts, Massachusetts Highway Department, Construction Standards, latest Edition with amendments, hereinafter referred to as the "Construction Standards."
3. MUTCD: Manual on Uniform Traffic Control Devices.
4. All control equipment shall conform to appropriate ITE and National Electrical Manufacturers Association (NEMA) Specifications.
5. Commonwealth of Massachusetts Architectural Access Board CMR 521.

1.5 EXAMINATION OF SITE AND DOCUMENTS

- A. It is hereby understood that the Contractor has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of a lack of knowledge of existing conditions as indicated in the Construction Documents, or obvious from observation of the site.
- B. Plans, surveys, measurements, and dimensions under which the work is to be performed are believed to be correct, but the Contractor shall have examined them for himself during the bidding period and formed his own conclusions as to the full requirements of the work involved.

PART 2 - PRODUCTS

2.1 SIGN MATERIALS

- A. Material for all sign panels shall be aluminum panels Type A-1 with high-intensity prismatic sheeting Type III or better in accordance with the relevant provisions of Section 828 Traffic Signs of the "Standard Specifications." Reflective sheeting shall meet the requirements of ASTM D4956 and AASHTO M268.

2.2 SIGN POSTS

- A. Sign supports and foundations shall be in accordance with the details indicated on the Contract Drawings and Section 840.60 of the "Standard Specifications." Signs shall be mounted on one 2¼-inch square, 14-gauge galvanized steel breakaway post. Each post shall have 7/16-inch-diameter die punched knockout/holes on all four sides for the entire length of the post. Knockout/holes shall be on the centerline of each side, 1-inch on center, in true alignment and opposite each other.

PART 3 - EXECUTION

3.1 SIGN INSTALLATION

- A. Sign fabrication and erection shall be in accordance with the relevant requirements of Sections 828 and 840 of the "Standard Specifications" and the "Construction Standards."
 1. Post foundations, except in ledge, shall be excavated by an auger to the next lines of the outside diameter of the footing without disturbing the soil around or below the excavation.

2. Concrete foundations shall be poured monolithically to grade.
- B. The Contractor shall mark the location of all on-site signs and shall obtain the approval of the Owner's Representative before any signs are installed.
 - C. Signs located in areas subject to pedestrian traffic shall be mounted with 7-foot clearance to the bottom of the sign.
 - D. Signs shall be mounted at right angles to the direction of, and facing, the traffic they are intended to serve. The sign panel shall be located a minimum of one foot from the curblineline or edge of pavement.
 - E. Solar Powered Flashing School Warning Sign shall be installed per manufacturers recommendation and conform to MUTCD standards.

End of Section

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Section 10 14 63
ELECTRONIC MESSAGE SIGNAGE

PART 1 – GENERAL

1.1 SUMMARY

- A. General: The work of this Section consists of exterior electronic signage where shown on the Drawings, as specified herein, and as required for a complete and proper installation.
- B. Furnish and install the following:
 - 1. Exterior electronic message signage (School Sign).

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4*, *LEED for Building Design and Construction*, *LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS: Temporary project sign and safety signage.
- E. Division 32 - EXTERIOR IMPROVEMENTS: Traffic and parking control signage, site school sign.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. All applicable federal, state and municipal codes, laws and regulations for signage.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Field Measurements

- a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, physical properties for each item furnished hereunder.
2. Shop drawings:
 - a. Plan drawing showing location of exterior sign. Coordinate plan with schedule.
 - b. Elevation drawings showing full size elevations of each sign. Indicate for each sign: sign styles, lettering and locations, and overall dimensions.
 - c. Large scale design details of signs, showing attachment clips and brackets; and complete installation details.
3. Selection samples:
 - a. Sample plastic chips indicating Manufacturer's full range of colors available for initial selection by Architect.
4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.
- B. Sign fabricator specializing in the work of this Section with a minimum of 3-years of experience.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
- B. Storage and Handling Requirements:
1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
- C. Packaging Waste Management: Comply with disposal and recycling requirements specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- D. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.
- 1.8 WARRANTY
- A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

PART 2 - PRODUCTS

2.1 SIGNAGE - GENERAL

- A. General: Provide sign copy to comply with the requirements indicated in the Drawings, for sizes, styles, spacing, content, positions, materials, finishes and colors of letters.
1. All Signs shall conform to United States "*Americans with Disabilities Act*" and Commonwealth of Massachusetts Regulation 521 CMR: *Architectural Access Board*.
 2. Final placing, (mounting heights) and sizing of lettering shall be in full compliance with 521 CMR requirements. Lettering shall have stroke width to height ratio and width to height ratio in accordance with the "*Americans with Disabilities Act*".
- B. Installation of all signs shall be done by vandal-proof method, fully described on the shop drawings.

2.2 SCHOOL SIGN

- A. School sign shall be furnished and installed by one of the following sign manufacturer's:
1. Kay Gee Sign Company, 200 Southbridge St., Auburn, MA 01501
 2. Sunshine Sign Company, Inc., 121 Westborough Road (Route 30), North Grafton, MA 01536, Phone: 508-839-5588.

3. Serrato Signs LLC, 15 Dewey Street Worcester, MA 01609, Phone: 508-756-7004
 - B. School sign shall be per the contract drawings and details, aluminum cabinet 7 feet high by 10 feet wide by 2 feet deep. Provide decorative cap as indicated.
 - C. (2) 10 MM LED Electronic Message Displays (Mono) shall also be furnished and installed within the cabinet housing with quick-lock frame, one facing in each direction, perpendicular to street.
 1. Basis of design will be Watchfire 10 mm medium resolution full color LED sign; 1'-0" high x 6'-0" wide (overall with surround = 1'-5" high x 6'-3" wide) x 5" deep; wireless radio control (1,000 - foot range).
 - D. Wireless controller shall be furnished for operation of LED message displays.
 - E. Operation training for LED message displays shall be provided to School Staff.
- 2.3 FABRICATION
- A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all in situ surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

3.3 INSTALLATION - GENERAL

- A. Locate sign units and accessories where indicated, locations in accordance with the approved shop drawings. Use mounting methods of the type described and in compliance with manufacturer's instructions.
- B. Install signs plumb, level and true to height indicated, with sign surfaces free from distortion or other defects in appearance.
- C. Shop fabricate signs where practical and deliver to site completely assembled. All joints of such fabricated work are completely smooth without apparent marks showing throughout the finish. All work "broken down" is erected so that all parts fit

accurately with hairline joints, with all joints flush. Joints in lighted signs shall be light-proof.

3.4 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- B. Clean work under provisions of Section 01 70 00 – EXECUTION.
- C. Waste Management:
 - 1. Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
 - 2. Dispose of liquid waste in accordance with all applicable regulations. Consult all regulations (federal, provincial, state, local) or a qualified waste disposal firm when characterizing waste for disposal. Contact manufacturer for MSDS sheets for product information, and recommendations for proposal disposal. Utilize licensed waste disposal companies as may be required, the following phone numbers for national companies are provided for the Contractor's convenience only.
 - a. Safety Kleen, Plano TX., (telephone 800-669-5740).
 - b. Clean Harbors, Norwell MA., (telephone 800-422-8998).
 - c. Phillip Services Corporation (PSC), Houston TX., (telephone 800-726-1300).

3.5 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

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Section 10 21 14
HDPE FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Floor to ceiling pilaster/wall mounted solid plastic toilet partitions.
 - 2. Urinal screens, matching toilet partition design and finish.
 - 3. Solid plastic shower stalls and changing stalls.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: In wall and ceiling blocking for partition panel support.
- F. Section 09 30 13 - CERAMIC TILING: Ceramic tile wall and floor finishes.
- G. Section 10 28 13 - TOILET ACCESSORIES: Furnishing templates, providing and installing toilet accessories surface mounted to toilet compartments, and integral with compartments.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standard and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES.
 - 1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, and manufacturer's warranty for each item furnished hereunder. Include information panel construction, hardware, and accessories.
 - 2. Shop drawings:

- a. 1/2 inch scale dimensioned plans and elevations of each toilet room condition showing urinal screen, and toilet compartment layout.
 - b. Large scale design details of showing attachment clips and brackets; and complete installation details.
3. Samples:
- a. Selection samples: Manufacturer's full range of color chips, for selection by the Architect; up to two-color combinations for doors and partitions may be selected in each area.
 - b. Verification samples: 6 inch square samples of each color and finish on same substrate to be used in Work, for color verification after selections have been made.
4. LEED Submittal Requirements:
- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.5 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.6 WARRANTY

- A. Furnish the following manufacturer's warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Manufacturer's warranties are in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.
 1. Manufacturer's written warranty, for a minimum period of 15 years from date of Project Substantial Completion. Warranty shall cover panel, pilaster and door material and manufacturing workmanship against defects, including delamination of surfacing, corrosion and breakage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND MODELS

- A. Acceptable Manufacturers for toilet compartments, urinal screens, shower and changing stalls and benches: Subject to compliance with the requirements

specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Scranton Products, Moosic, PA.
2. Global Partitions, Estanollee, GA.
3. Hadrian Inc., Mentor, OH.

2.2 FABRICATION

A. General:

1. HDPE solid polymer resin components (pilasters, doors, screens, panels and bench tops) shall contain a minimum 10 percent recycled material (post-industrial).
2. Refer to the Drawings for all fasteners, connections, sizes, dimensions, thicknesses and configurations of all HDPE solid polymer resin components, including but not limited to pilasters, doors, screens, panels and bench tops.

B. Toilet compartments: Flush type, floor to ceiling supported, of standard height and depth, except for sizes of handicapped compartments, which shall be as indicated on the Drawings. Acceptable models are the following, or approved equal:

1. Scranton Products, Moosic, PA. "Hiny Hiders" series.
2. Global Partitions, Estanollee, GA.
3. Hadrian Inc., Mentor OH., "Solid Plastic" Partitions.

C. Pilasters (stiles): HDPE solid polymer resin, 1-1/4 inch thick, 82 inches high of required depth with uniformly radiused edges in color selected by Architect from manufacturer's full available range of solid colors.

D. Bench Tops: HDPE solid polymer resin, 1-1/4 inch thick, uniformly radiused edges, in color selected by Architect from manufacturer's full available range of solid colors.

E. Panels, stalls and doors: HDPE solid polymer resin, 1 inch thick, minimum 55 inches high, of required depth with uniformly radiused edges, in color selected by Architect from manufacturer's full available range of solid colors.

F. Pilaster floor shoes: 3 inches high formed stainless steel with satin finish.

G. Hardware and fittings: Type 302/304 stainless steel.

1. Door hinges: Continuous spring loaded hinge for full height of door, through bolted to door and stile with theft resistant one-way screws fastening into receiving metal inserts.
2. Door latch with nylon slides. Door keeper, one piece 11 gage stainless steel.
3. Panel to stile connection: Full panel height "U" shape stainless steel channel.
4. Panel to wall connection: Full panel height "U" shape stainless steel channel and "Double T" shape stainless steel channel.
5. Continuous strikes shall be full height of door.
6. Continuous single and double ear brackets.
7. Stainless steel shoes.

2.3 ACCESSORIES

- A. Equip all doors with combination coat hook and bumper. Where bumper will not adequately make contact with wall surface provide wall bumpers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Verify correct spacing of plumbing fixtures.
- C. Ensure wall blocking is coordinated with location of anchors before commencing with installation.
- D. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION - GENERAL

- A. Comply with manufacturer's recommended procedures and installation sequence, and as specified herein.
- B. Install pilasters, partitions, urinal screens, and doors rigid, straight, plumb and level. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Anchor urinal screen panels to walls with two panel brackets and tube vertical upright anchored to floor.
- D. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.
- E. Hang door and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- F. Ensure that all holes in partitions, as required for attachment of related items, are accurately located and drilled, in accordance with the templates furnished by the accessory manufacturer. Conceal all evidence of drilling, cutting, and fitting in the finished work.
- G. No permanent exposed to view labels of any kind will be permitted to remain on the partitions, headrails, urinal screens or doors.

3.3 FIELD QUALITY CONTROL

- A. Ensure that all work is free from dents, tool marks, warpage, buckle, open joints, or other defects. Protect compartments during erection, and after erection, and until final approval of the entire project by the Architect.

3.4 ADJUSTMENT

- A. Adjust and align hardware to provide a uniform clearance at vertical edges of doors not to exceed 3/16 inch.

- B. Adjust hinges to locate doors in partial-open position (approximately 30 degrees open) when unlatched. Return outswing doors to closed position.
- C. Test operation of movable parts, and make all adjustments necessary to ensure proper operation.

3.5 CLEANING

- A. Upon completion of the installation, remove all evidence of tapes and other packing materials and thoroughly clean and polish all exposed to view surfaces.
- B. Provide protection as necessary to prevent damage during remainder of construction period.

3.6 SPARE STOCK

- A. Provide the following items as stock.
 - 1. 4 complete door latch assemblies.
 - 2. 1 complete hinge assembly.
 - 3. 4 complete wall brackets.

End of Section

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Section 10 21 23
CUBICLE CURTAINS AND TRACK

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Suspended cubicle curtain track and guides.
 - 2. Track suspension components and accessories.
 - 3. Curtains.
- B. Furnish the following products to be installed under the designated Sections:
 - 1. Above ceiling anchor devices to support curtain track, installed by Section 05 50 00 – METAL FABRICATIONS.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 05 50 00 - METAL FABRICATIONS: Metal supports channel above suspended ceilings to support track.
- F. Section 06 10 00 - ROUGH CARPENTRY: Above ceiling wood blocking and curbing.
- G. Section 09 51 00 - ACOUSTICAL CEILINGS: Suspended acoustical tile ceiling system.

1.3 REFERENCES

- A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. NFPA 701 - Fire Tests for Flame Resistant Textiles and Films.
 2. UL Flammability Test N° 214.
 3. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 SUBMITTALS

- A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
 2. Shop drawings:
 - a. 1/4 inch scale reflected ceiling plans indicating view of curtain track, hangers and suspension points.
 - b. Large scale details of track showing suspension system, attachment clips and brackets; and complete installation details.
 3. Selection samples:
 - a. Sample fabric swatches minimum 3 by 5 inch size, indicating manufacturer's full range of colors and textures available for selection by Architect.
 - b. Provide additional samples as requested by Architect for initial selection of colors and finishes.
 4. Verification samples:
 - a. 12 inch long section of track.
 - b. Track splice, wall and ceiling hanger and escutcheon.
 - c. 12 by 12 sample patch of selected curtain cloth and shower curtains with representative hem stitch detail, heading with reinforcement, and carrier attachment to curtain header.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 - 1. Maintenance data: Include recommended cleaning methods and materials and stain removal methods.
 - 2. Bonds and Warranty Documentation: Include coverage of materials and installation and resultant damage from failure of installation to resist penetration of moisture.
 - C. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 - 1. Extra Stock Materials:
 - a. Two curtains.
 - b. Ten extra carriers.
- 1.5 DELIVERY, STORAGE AND HANDLING
- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver, and store products in manufacturer's original sealed cartons.
 - 3. Accept curtain materials on site and inspect for damage.
 - B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures. Store curtain materials and deliver to the Owner to installation at Substantial Completion.
 - a. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
 - b. Store in manner to prevent twist or warp of track sections.
- 1.6 FIELD MEASUREMENTS
- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
- 1.7 SEQUENCING AND SCHEDULING
- A. Coordinate the work of this Section with trades responsible for installation of suspended ceilings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on A.R. Nelson Company (Arnco), St. Louis, MO., Product: "1200-CT Heavy Duty Track".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Bradley Corporation, Menomonee Falls, WI.
 - 2. AR Nelson, St. Louis, MO.
 - 3. Salsbury Industries, Los Angeles, CA.
 - 4. InPro Corporation (ClickEZE), Muskego, WI.
 - 5. Bobrick Washroom Equipment, Inc. (Bobrick), Clifton Park, NY.

2.2 DESCRIPTION

- A. Regulatory Requirements:
 - 1. Conform to applicable codes for flame/spread rating of 25 for curtains when tested in accordance with ASTM E 84. Provide certificate of compliance from authority having jurisdiction.

2.3 PERFORMANCE/DESIGN CRITERIA

- A. Capacities:
 - 1. Track: To support vertical test load of 50 pounds without visible deflection of track or damage to supports. Size track to support moving loads.
 - 2. Size track to support moving loads, sufficiently rigid to resist visible deflection and without permanent set.

2.4 CURTAIN TRACK

- A. Track:
 - 1. Manufacturer's model (or equal):
 - a. A.R. Nelson (Arnco), product: "1200CT heavy duty track".
 - b. Salsbury Industries, product: "19901".
 - c. InPro (ClickEZE), product: "Ultra-Cube" track.
 - 2. Track shall be extruded aluminum having over-all dimensions of 1-3/8 inches wide by 3/4 inch high by 0.062 inch minimum wall thickness. Design for surface application with side projections to overcome ceiling irregularities and affording a method for scribing a tight, neat line to the ceiling.
 - 3. Suspended Track: Extruded-Aluminum Suspended Track; 1-7/16 inches wide by 15/16 inch high aluminum track.
 - a. Curved Track: Factory fabricated 12-inch radius bends.
 - b. Finish: Satin anodized or White baked enamel.

4. Track Accessories: End caps, connectors, end gates, coupling and joining sleeves, wall brackets, ceiling flanges, and other accessories.
 - a. Suspended Track Support: Not less than 1 inch outside diameter aluminum tube.
 - b. End Stop: Removable.
 - c. Finish: Satin anodized or White baked enamel.
5. Curtain Carriers:
 - a. (2) No. 12 nylon rollers, nylon axle and tangle free nylon swivel stem with chrome-plated steel hook.
 - b. (1) No. 11 one-piece nylon glide, tangle free nylon swivel with chrome-plated steel hook.
 - c. No. 20 Breakaway Carrier: Three-piece nylon wheels, body and hook, recommended for use in No. 1200CT Cubicle Track.
6. Provide switch for tracks in rooms shown with side by side beds, so that one cubicle can service two beds.
7. Finish for track and fittings: Clear anodized finish

2.5 CUBICLE CURTAINS

- A. As manufactured by AR Nelson, St. Louis, MO., with the following characteristics:
 1. Fiber Content: 100 percent polyester, inherently and permanently flame resistant.
 2. Include open nylon mesh at top 14 inches of curtain for room air circulation.
 3. Curtain heading of triple thickness 2 inches wide, with grommetted holes for carriers at 6 inches on center, double fold bottom hem 2 inches wide, included lead weights. Lockstitch seams in two rows. Turn seam edges and lockstitch.
 4. Color and style: As selected by the Architect from full range of color and fabrics

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and above ceiling supports and verify that they are in proper condition to receive the work of this Section. Verify field measurements are as shown on shop drawings.
- B. Beginning of installation means acceptance of existing surfaces, supports and project conditions.

3.2 INSTALLATION

- A. Install track rigid, and true to ceiling line, secured to ceiling system or to track hangers where suspended systems are required.
- B. Install end cap and stop devices as indicated on approved shop drawings.
- C. Install curtains on carriers ensuring smooth operation.

3.3 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

Section 10 22 13
WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install wire mesh partition system at Auto/Diesel Shop for walls (floor to overhead structure/decking installation) complete with access doors, all accessories and related hardware.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking, edgings, nailers curbs, cants, cants grounds, furring, and sheathing.
- E. Section 08 71 00 - DOOR HARDWARE: Cylinders for locksets.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM A 36 - Structural Steel.
 - 2. ASTM A 123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A 366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
 - 4. ASTM A 446 - Sheet Steel, Zinc-Coated (Galvanized) by the Hot Dip Process, Structural (Physical Quality).
 - 5. ASTM A 500 - Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 6. ASTM A 501 - Hot-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 7. ASTM A 510 - General Requirements for Wire Rods and Course Round Wire, Carbon Steel.
 - 8. AWS D1.1 - Structural Welding Code.
 - 9. FS QQ-W-461 - Wire, Steel, Carbon, (Round, Bare, and Coated).
 - 10. FS TT-P-645 - Primer Paint, Zinc Oxide, Alkyd Type.

11. SSPC - Painting Manual.

1.4 DESIGN REQUIREMENTS

- A. Design partition system to provide for movement of components without damage, undue stress on fasteners or other detrimental effects, when subject to design loads.
- B. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for wire mesh partitions and related components, including, but not limited to: partition framing, supports and bracing, wire mesh, and hardware.
 - 2. Manufacturer's installation instructions: Indicate special procedures, perimeter conditions requiring special attention
 - 3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 - 4. Shop drawings:
 - a. 1/4 inch scale elevations and plans of each wire mesh partitions.
 - b. Large scale design details showing attachment clips and brackets; and complete installation details. All details bearing dimensions of actual measurements taken at the project.
 - 5. Selection samples:
 - a. Sample card indicating Manufacturer's full range of colors available for selection by Architect.
 - 6. Verification samples:
 - a. 12 x 12 inch samples of wire mesh illustrating construction and selected finish.
 - b. 12 inch long samples of framing components.
 - c. Samples of hinge, latchset, which will be returned for incorporation into the work.
 - 7. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product

Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.6 QUALITY ASSURANCE

- A. Obtain partition components and hardware from a single manufacturer.
- B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the specified products with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver components in original packages, containers or bundles bearing part identification and number.
- B. Store materials inside, under cover, and in manner to keep them dry, protected from weather, corrosion, and damage from construction traffic and other causes.

1.9 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.11 WARRANTY

- A. Provide manufacturer's standard 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Wirecrafters, Louisville, KY, "Style 840 Woven Wire Partition System".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Wirecrafters, Louisville, KY.
 2. Acorn Wire and Ironworks, Chicago IL.
 3. Central Wire and Iron Works, Des Moines IA.
 4. Major Partitions, Tampa FL.
 5. Newark Wire Works, Edison NJ.

2.2 COMPONENTS

- A. Wire Mesh Partitions: Factory-assembled, full-mesh style, modular interchangeable units that allow expansion without waste of components, complete with all components, accessories, hardware, and fasteners.
1. Provide fixed sections unless otherwise indicated.
 2. Section Width: 60 inches (1830 mm) unless otherwise indicated on the Drawings.
 3. Provide special width panels to achieve partition dimensions indicated.
 4. Panel frames bolted together and to posts at 18 inches (457 mm) on center vertically.
 5. Height: As indicated.
 6. Finish: Electrostatic sprayed enamel, in color selected from manufacturer's full line of standard colors.
- B. Wire Mesh Panels: Steel channel frames with wire mesh securely clinched through holes in channels; frame joints mortise and tenoned.
1. Wire Mesh: 6 gauge steel wire woven into 2 inch (50 mm) diamond mesh.
 2. Frame Members: Steel channels 1-1/2 inch (38 mm) by 3/4 inch (19 mm); extended below bottom horizontal to form post feet.
 3. Provide intermediate horizontal stiffener channels of same dimension as frame members at approximately 36 inches (915 mm) above floor level and at not more than 60 inches (1830 mm) apart vertically; wires woven through stiffener channels.
- C. Hinged Door Sections: Matching wire mesh panels.

1. Hinge Side, Top and Bottom Frame Members: 1-1/2 inch (38 mm) by 3/4 inch (19 mm) channel with 1-1/2 inch (38 mm) by 1/8 inch (3 mm) flat bar cover.
 2. Lock Side Frame Members: 1-5/8 inch (41 mm) by 7/8 inch (22 mm) by 1/8 inch (3 mm) angle, riveted.
 3. Width: As indicated on Drawings.
 4. Door Opening Height: 108 inches (2743 mm), minimum.
 5. Hinges: 4 heavy duty butt hinges riveted to door panel and frame.
 6. Lock: 5 button coded access lock equal to Wirecrafters model "CF-2" with "CB-2" push paddle on interior side of door.
- D. Corners and Intersections:
1. 90 Degree Corner: Full height 1-3/4 inch (44 mm) by 1-3/4 inch (44 mm) steel angle.
 2. 3- and 4-Way Intersections: Clips.
 3. Other Corners: Full height 2-3/8 inch (60 mm) outside diameter pipe post.
- E. Straight Run Posts: 5/16 inch (8 mm) thick flat steel bars; provide between each section of partition.
1. Panels Over 16 feet (4884 mm) High: 3-1/2 inches (89 mm) wide posts.
 2. Panels 12 feet (3657 mm) to 16 feet (4884 mm) High: 3 inches (76 mm) wide posts.
 3. Panels 7 feet (2134 mm) to 12 feet (3657 mm) High: 2-1/2 inches (63 mm) wide posts.
- F. Floor Sockets: Aluminum; 2-1/2 inches (63 mm) high; set screws to secure posts at adjustable height.
- G. Top Bar: Continuous steel channel stiffening length of partition run.
1. Size: 3 inches (76 mm) by 4.1 pounds per ft (6 kg/m).
 2. Anchored to panel frames with 5/16 inch (8 mm) U-bolts at 28 inches (710 mm) on center.
 3. Anchored to adjacent structure as indicated on drawings.
- 2.3 ACCESSORIES
- A. Bolts, Nuts and Washers: Hot-dip galvanized.
 - B. Anchorage devices: Power driven, powder actuated, or drilled expansion bolts.
 - C. Exposed mechanical fastenings: Flush countersunk screws or bolts, unobtrusively located, consistent with design of structure.
 - D. Shop and touch-up primer: SSPC 15, Type 1, red oxide.
- 2.4 FABRICATION
- A. Fabricate assemblies of framed sections; to sizes and profiles required; with framing members fitted, reinforced and braced, to suite design requirements.

- B. Fit and assemble in largest practical sections for deliver to site, ready for installation.
- C. Fabricate items with joints tightly fitted and secured. Make exposed joints flush and hairline.
- D. Grind exposed welds flush and smooth with adjacent finish surface. Ease exposed edges to small uniform radius.
- E. Provide components required for anchorage to adjoining construction. Fabricate anchorage and related components of same material and finish as framing members.
- F. Fabricate openings made for penetrating mechanical and electrical components.
- G. Fabricate door for hinged operation.

2.5 FACTORY FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. All members shall shop-applied electrostatic sprayed enamel finish, in color selected by Architect from Manufacturer's standard range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Verify that field measurements are as shown on the Shop Drawings.
- C. Beginning of installation means acceptance of existing project conditions.

3.2 ERECTION

- A. Erect and install in accordance with manufacturer's instructions. Install level and plumb, accurately fitted, free from distortion or defects.
- B. Perform field welding in accordance with AWS D1.1. After installation, touch-up field welds scratched or damaged surfaces with shop applied finish.
- C. Adjust doors to achieve free movement.

3.3 TOLERANCES

- A. Maximum variation from plumb or level: 1/4 inch.
- B. Maximum misalignment from true position: 1/4 inch.

3.4 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

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Section 10 28 13
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install toilet, bath, classroom sink and custodial accessories.
- B. Furnish concealed anchorage devices for handicap handrails for installation under Section 06 10 00 - ROUGH CARPENTRY.
- C. Furnish toilet and bath accessory templates, to locate anchorage reinforcement, to trades responsible.
- D. Install Owner-provided toilet accessories.
- E. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY:
 - 1. Wood blocking.
 - 2. Installation of concealed anchorage devices for grab bars in toilet rooms: Section 10 28 13 - TOILET ACCESSORIES.
- F. Section 08 80 00 - GLAZING: Frameless mirrors.
- G. Section 09 29 00 - GYPSUM BOARD: Gypsum board partitions and metal framing.

- H. Section 09 30 13 - CERAMIC TILING: Tiled walls as substrate for toilet accessories.
- I. Section 10 21 13 - HDPE FABRICATIONS: Accessories mounted to toilet compartments.
- J. Division 22 – PLUMBING: Plumbing fixtures.
- K. Division 26 – ELECTRICAL: Hand dryers.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ANSI A 117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable by Physically Handicapped People.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, for each item furnished hereunder.
 - 2. Schedule: Complete schedule, indicating types, quantity, and model numbers of accessories for each location in which the accessories will be installed.
 - 3. Selection samples: Sample color chips indicating each manufacturer's full range of colors available for selection by Architect.
 - 4. 12 by 12 inch sample patch of shower curtain.
 - 5. Verification samples: Complete units, as requested by Architect.
 - 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions

requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.

- e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable codes and accessibility regulations, and comply with ANSI A 117.1 for installation of work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages, containers or bundles bearing brand name, identification of manufacturer or supplier and item identification number corresponding with approved schedule.
- B. Store materials inside, under cover, and in manner to keep them dry, protected from weather, surface contamination, corrosion and damage from construction traffic and other causes.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.8 WARRANTY

- A. Deliver to the Owner upon completion of the work of this Section, applicable manufacturer's standard warranties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufactures and models: To establish a standard of quality, design, function desired, and appearance, Drawings and specifications have been based on manufacturers and model numbers specified herein below. Manufacturers offering products which may be considered as equal include the following:
 - 1. A&J Washroom Accessories, Inc., (A&J) New Windsor NY.
 - 2. American Specialties, Inc. (ASI), Yonkers NY.
 - 3. Bobrick Washroom Equipment, Inc. (Bobrick), Clifton Park NY.
 - 4. Bradley Corporation / Washroom Accessories Division, (Bradley) Menomonee Falls, WI.
 - 5. Rubbermaid Commercial Products, LLC., Winchester, VA.

2.2 TOILET ACCESSORIES

- A. Manufacturer: To establish a standard of quality, design, function desired, and appearance, Drawings and specifications have been based on manufacturers and model numbers specified herein below.
- B. Baby Changing Station (CT): Surface mounted diaper changing station equal to Rubbermaid Commercial Products, LLC., Winchester VA, Model "Sturdy Station 2" having the following characteristics.
1. Horizontal format design, protruding from wall not more than 4 inches (102mm) from wall when in retracted position.
 2. Unit shall comply with Federal ADA Accessibility Guidelines, ANSI A117.1
 3. Unit shall have a maximum holding capacity of 250 lbs. (113.4 kg) and shall be fabricated of non-porous plastic (FDA approved HDPE) tested according to ASTM G21 and ASTM G22.
 4. No parts of the operating mechanism shall be accessible when unit is open or closed to provide a tamper-resistant and pinch proof user environment. Provide unit with damped gas spring to assist user in opening and closing unit with one hand.
 5. Unit shall be provided with two integral heavy-duty bag hooks clearly marked with international-style symbols. Unit shall provide a bed-liner dispenser with concealed, self-latching lock requiring no keys, that may be easily converted to a multi-fold towel dispenser with no adapters.
 6. Provide unit with an adjustable two-part child protection safety-strap mounted with concealed fasteners on high walls of cradle. Rear strap shall be vinyl coated. Entire unit shall be assembled of completely sealed components to provide easy cleaning and no penetration zones to harbor microbes or bacteria.
 7. Mounting fasteners shall be concealed after installation using color matched recess plug-covers.
- C. Coat/robe hook (CH): Surface mounted satin finish stainless steel double robe hook, fabricated from 22 gage type 304 stainless steel, protrudes from wall nominally 1-7/8 inches.
1. Basis of Design: Bobrick model N°. B-7672.
 2. A&J, model N°. UX112-SF.
 3. ASI model N°. 7345-S.
 4. Bradley model N°. 9124.
- D. Grab bars (of lengths and configurations as indicated): Stainless steel, minimum wall thickness 18 gage (Stub's gage), with non-slip knurled, peened or striated surface.
1. Grab bars: 1-1/4 inch diameter with satin finished ends, concealed 1/8 inch thick mounting flange with snap-on cover, equal to:
 - a. A&J series UG2X.
 - b. ASI series 3700.
 - c. Bobrick series B-5806.99.
 - d. Bradley series 832.

2. Grab bar sizes:
 - a. GB1: 42 inches.
 - b. GB2: 36 inches

- E. Grab bars at accessible showers (GB3): Stainless steel, minimum wall thickness 18 gage (Stub's gage), with non-slip knurled, peened or striated surface. 1-1/4 inch diameter with satin finished ends, concealed 1/8 inch thick mounting flange with snap-on cover. (Provide configuration as indicated on Drawings verify clearances prior to installation of blocking).
 1. "L" shape grab bar with 24 inch and 36 inch leg lengths:
 - a. A&J series UG20X.
 - b. ASI model 3750-P.
 - c. Bobrick series: B-58616.99.
 - d. Bradley series: 832 Series, 059 Configuration.

- F. Electric dryer (HD): high speed, low energy consumption surface-mounted hand dryer with no-touch infrared-sensor operation. Automatic shut-off after 90 seconds of non-use. GreenSpec™ Listed.
 1. Electrical requirements, 115 volt AC, 9 amp, 60hz. 900-1500 watts.
 2. Cover: One piece having brushed stainless steel finish.
 3. Acceptable models:
 - a. ASI 'Turbo-Dry High Speed Dryer', model N°. 0199-2-93.
 - b. Excel Dryer model N°. XL-SB
 - c. World Dryer 'Airforce' series, model N°. J-972

- G. Mirrors (M1), roll-formed angle framed: 18 inches wide by 30 inches high, having the following:
 1. Frame: one piece 3/4" by 3/4 inch type 304 18 gage stainless steel roll formed frame, with continuous integral stiffener on all sides. Corners shall be heliarc welded, ground and polished smooth.
 - a. Exposed finish: Brushed satin
 2. Back: Mirror back shall be protected by full-size, shock-absorbing, water-resistant, non-abrasive 1/8" (3-mm) thick polyethylene padding. Galvanized steel backing shall have integral brackets for concealed mounting.
 3. Mirror glass: 1/4 inch thick clear glass, ASTM C 1048 with Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1, with Class 1, standard commercial quality, electro-copper back-plating protected by a corrosion-resistant zinc-coating.
 4. Corrosion resistant backing shall have minimum 15 year warranty.
 - a. Acceptable models:
 - 1) Basis of Design: Bobrick model N°. B-290.
 - 2) A&J model N°. U700-VC.
 - 3) ASI model N°. 0600
 - 4) Bradley model N°. 780.
 - 5) Meek model N°. M1210.

- H. Mirrors (M2, locker rooms only): roll-formed angle framed, size(s) as scheduled or otherwise indicated on Drawings, having the following features:
1. Frame: one piece 3/4" by 3/4 inch type 304 18 gage stainless steel roll formed frame, with continuous integral stiffener on all sides. Corners shall be heliarc welded, ground and polished smooth.
 - a. Exposed finish: Brushed satin
 2. Back: Mirror back shall be protected by full-size, shock-absorbing, water-resistant, non-abrasive 1/8" (3-mm) thick polyethylene padding. Galvanized steel backing shall have integral brackets for concealed mounting.
 3. Mirror glass: 1/4 inch thick clear glass, ASTM C 1048 with Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1, with Class 1, standard commercial quality, electro-copper back-plating protected by a corrosion-resistant zinc-coating.
 - a. Mirror corrosion resistant backing shall have minimum 15 year warranty.
 4. Shelf: One piece 5 inch deep shelf, integral with frame with hemmed 3/8 inch to 1/2 inch return hemmed dropped edge on front and sides. Satin finish, matching mirror frame
 5. Acceptable models:
 - a. A&J model N°. U705.
 - b. ASI model N°. 0605.
 - c. Bobrick model N°. B-292.
 - d. Bradley model N°. 7805.
 - e. Meek model N°. M1210, with M3110 "integral shelf".
- I. Sanitary napkin disposal (FD1): Surface mounted feminine napkin disposal unit, fabricated of type 304 stainless steel, with one piece cover.
1. Basis of Design: Bobrick model B-270 ("Contura" Series)
 2. A&J, model N°. U591
 3. A.S.I., model 0852
 4. Bradley model N°. 4722-15
- J. Sanitary napkin disposal (FD2): Partition mounted feminine napkin disposal unit serving two toilet compartments.
1. Basis of Design: Bobrick B-354
 2. A&J, model N°. U580
 3. A.S.I. 0472
 4. Bradley model N°. 4721-15
- K. Utility Shelf: Type 304 stainless steel, 5 inches deep by 16 inches wide with 3/4 inch edge return. Mounting brackets, 16 gage welded to shelf.
1. Basis of Design: Bobrick model N°. B-295x16.
 2. A&J U7 Series.
 3. ASI 0692-524 Series.
 4. Bradley 755 Series.

- L. Shelving: Custodial shelf, stainless steel, 6 inches deep by 18 inches wide with 3/4 inch edge return. Mounting brackets, 16 gage welded to shelf.
 - 1. Basis of Design: Bobrick model N°. B-296.
 - 2. A&J model N°. U776.
 - 3. ASI model N°. 0692.
 - 4. Bradley model N°. 756.

- M. Shower seat (ST): Folding type with cushion shall have a frame constructed of type-304, satin finish stainless steel. Seat cushion shall be 1-1/2 inches thick foam padding mounted on 1/2 inch thick plywood and covered in water-resistant reinforced vinyl fabric. Seat shall be able to lock in upright position when not in use and comply with ADA Accessibility Guidelines (ADAAG). Seat supports shall not come into contact with floor. Provide left or right hand seat.
 - 1. A&J model N°. U933-1AR or U933-1AL, as indicated.
 - 2. ASI model N°. 8205R or 8205L as indicated.
 - 3. Bobrick model N°. B517 or B518, as indicated.
 - 4. Bradley model N°. (n/a)

- N. Shower curtain rods (SR): 1-1/4 inch outside diameter, Stainless steel, minimum wall thickness 18 gage (Stub's gage), with stainless steel 2-1/2 inch flange and concealed fasteners. Lengths as required for locations shown on the Drawings.
 - 1. A&J model N°. UX2 with 3 inch flange.
 - 2. ASI model N°. 1204-4.
 - 3. Bobrick model N°. B-6047.
 - 4. Bradley model N°. 9539.
 - 5. Approved equal.

- O. Vinyl curtain (SR): 10 oz. nylon reinforced curtain, with 6 inch center-to-center aluminum grommets, hemmed top edge. Material shall be antimicrobial, flame proof, stain resistant and self-deodorizing.

- P. Curtain rings (SR): Type 304 Stainless steel, 0.09 inch diameter, with snap fasteners. Provide one ring for every 6 inches, or fraction thereof of each curtain rod.

- Q. Coordinate the installation of Owner Furnished Construction Manager Installed (OFCI) toilet accessories:
 - 1. Toilet tissue dispensers.
 - 2. Soap dispensers.
 - 3. Wall mounted glove dispensers.
 - 4. Paper towel dispensers.
 - 5. Free standing waste receptacles.

2.3 LOCKS

- A. General: All locks shall be keyed alike. Provide four (4) keys, for lockable accessories, to the Owner.

2.4 INSTALLATION ACCESSORIES

- A. Fasteners, screws, and bolts: Type 304 stainless, tamperproof.
- B. Expansion shields: Fiber, lead or rubber as recommended by accessory manufacturer for component and substrate.

2.5 FABRICATION

- A. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion, scratches or dents. Weld and grind smooth joints of fabricated components.
- B. Back paint components where contact is made with building finishes to prevent electrolysis.
- C. Shop assemble components and package complete with anchors and fittings. Hot dip galvanize exposed and painted ferrous metal and fastening devices. Provide steel anchor plates, adapters, and anchor components for installation.

2.6 FACTORY FINISHING

- A. Ferrous metals: Clean and treat, spray apply one coat of baked-on rust and moisture-resistant primer, followed by two coats of baked-on synthetic enamel, in selected colors. Ensure that finish coating is uniform in color intensity and degree of gloss, throughout.
- B. Chrome/Nickel Plating: ASTM 456, Type SC2, satin finish.
- C. Stainless steel: Number 4 satin finish, except as otherwise specified above under the Article entitled "Toilet Accessories".

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide templates and rough-in measurements as required. Deliver inserts and rough-in frames to site at appropriate times for building-in by other trades
- B. Coordinate with trades responsible for providing receiving surfaces on which accessories will be installed.
- C. Exact locations of accessories within each room or area shall be as directed by the Architect.

3.2 INSTALLATION

- A. Perform installation work in accordance with the approved shop drawings and the manufacturer's installation instructions.
- B. Install toilet accessories absolutely level and in true line, securely and rigidly anchored with theft proof fasteners of the size and type most appropriate for the specific receiving surface, concealing the fasteners as far as practicable.

3.3 ADJUSTING

- A. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

3.4 CLEANING

- A. Remove all protective films and coverings from accessories, and clean and polish each piece. Remove all rubbish, packing materials, and debris, caused by the work of this Section.

End of Section

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Section 10 40 00
SAFETY SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install:
 - 1. Fire extinguisher cabinets, (fire rated and non-rated types).
 - 2. Fire extinguisher brackets.
 - 3. Fire extinguishers: Provide 20 pound capacity extinguishers at locations called out on the Drawings.
 - 4. Defibrillators and semi-recessed cabinets.
 - 5. Safety data sheet storage cabinets.
 - 6. Safety specialty signage.
 - 7. Cabinet and bracket accessories.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 04 20 00 - UNIT MASONRY: Concrete masonry unit partitions.
- F. Section 06 10 00 - ROUGH CARPENTRY: Wood rough-in framing and blocking.
- G. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Framed wall openings
- H. Section 09 29 00 - GYPSUM BOARD: Gypsum wallboard finishes.

- I. Division 21 - FIRE SUPPRESSION: Fire hose connections and related cabinets and accessories.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. NFPA 10 – Standard for Portable Fire Extinguishers, 2013 Edition.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, indicating: fabrication specifications, finishes, dimensions of cabinet and rough opening, and installation instructions.
 - 2. Shop drawings: Details showing unit dimensions, methods of construction, attachment clips and brackets; and complete installation details.
 - 3. Selection samples: Samples indicating metal finishes available for selection by Architect.
 - a. Provide additional samples as requested by Architect to facilitate initial selection of colors and finishes
 - 4. Verification samples: Fire extinguisher cabinet in specified size, finishes, and door type, if requested by Architect.
 - 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.

- e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.

1.5 REGULATORY REQUIREMENTS

- A. Obtain certificate of compliance from authority having jurisdiction indicating approval of fire extinguisher cabinets and their installed locations.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver cabinets or extinguishers to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Store cabinets and extinguishers inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. J.L. Industries, Bloomington MN.
 - 2. Larsen Manufacturing Co., Minneapolis MN.
 - 3. Potter-Roemer, Union NJ.
 - 4. Strike First Corporation of America, Front Royal, VA (*fire extinguishers only*).
 - 5. Amerex Corporation, Trussville, AL (*fire extinguishers only*).

2.2 FIRE EXTINGUISHERS CABINETS AND BRACKETS

- A. Fire extinguisher cabinets:
 - Cabinet trim style: Rolled edge, semi-recessed cabinet.
 - a. Protruding from wall: 1-1/4 inches.
 - 1. Door and trim: Type 304 Stainless steel with a Number 4 (satin) polished finish.
 - b. Vertical duo design with tempered glazing.
 - c. Vigilante alarm: Provide 9 volt, battery operated (battery included), plunger activated vigilante alarm.
 - d. Handles: Red door handles having raised letters "FIRE".
 - e. Lettering: Factory applied die-cut lettering, applied to metal portion of door.
 - 1) Pattern: Vertical reading.
 - 2) Color: As selected by the Architect.

2. Cabinet construction:
 - a. Non-rated cabinet construction: 18 gage cold-rolled steel with factory applied baked acrylic enamel corrosion-resistant finish.
 - b. Fire-resistance rated cabinet construction for up-to a two hour wall rating: 18 gage cold-rolled steel double wall construction with fire barrier material lining in compliance with ASTM E-814 (UL1479). Provide cabinet with factory applied baked acrylic enamel corrosion-resistant finish.
 3. Acceptable models for non-fire-resistant rated assemblies:
 - a. JL Industries "Cosmopolitan Series", model number 2037.
 - b. Larsen "Architectural Series", model number SS2712-RK.
 - c. Potter-Roemer, "Alta Series", model number 7065.
 4. Acceptable models for fire-resistant rated assemblies:
 - a. JL Industries "Cosmopolitan Series", model number 2037-FX2.
 - b. Larsen "Architectural Series", model number FS-SS2712-RK.
 - c. Potter-Roemer, "Alta Series", model number FRC7065.
- B. Wall mounting bracket: 16 gage steel surface mounted bracket, with red glossy polyester thermo-set coating, equal to the following. Provide with red letter decals spelling "FIRE EXTINGUISHER" applied to wall surface, letter size, style as required by code, location as selected by Architect.
1. Basis of Design: Larsen model number 864.
 2. JL Industries, model number "MB-810".
 3. Potter-Roemer, model number 3903.
- 2.3 FIRE BLANKET CABINETS AND BLANKETS
- A. Combination fire extinguisher and blanket cabinet: Fully recess mounted combination fire extinguisher/fire blanket cabinet. Provide solid door labeled with red letters "FIRE EXTINGUISHER" (vertical) and "FIRE BLANKET" (horizontal), equal to:
1. Basis of Design: Larsen Manufacturing Co., model "FB 3612-R" or approved equal..
 2. Potter-Roemer, model number 6609.
- B. Fire blanket cabinet: Surface mounted blanket cabinet. Fabricate from 18 gage cold-rolled steel with factory applied red baked enamel finish with solid door labeled with white letters "FIRE BLANKET" (horizontal), equal to:
1. JL Industries, model "2FB".
 2. Larsen Manufacturing Co., model "FB 1016".
 3. Potter-Roemer, model number 6601.
- C. Fire blanket: Nominal 62 by 80 inch sized woven wool blanket, treated with fire resistant chemicals meeting FS-CS-191-53.

2.4 FIRE EXTINGUISHERS

- A. Extinguishers (typical including elevator machine room): Multi-purpose dry chemical type (mono ammonium phosphate), 20 pound capacity, multi-purpose rated '20A, 120B:C'; with metal valves and siphon tubes, replaceable molded valve stem seals, pressure gauges and hose discharge.
- B. Extinguishers (fire blanket cabinets): Non-toxic Multi-purpose dry chemical type (mono ammonium phosphate), 10 pound capacity, multi-purpose rated '4A, 80B:C'; Heavy Duty DOT Steel Cylinder Extinguisher with metal valves and siphon tubes, replaceable molded valve stem seals, corrosion and impact resistant polyester/epoxy paint finish, pull pin-upright squeeze grip operation, and pressure gauges.
- C. Extinguishers (Kitchen areas): Wet chemical type (potassium acetate based), 2-1/2 gallon capacity, rated '2A:K'; with metal valves and siphon tubes, replaceable molded valve stem seals, pressure gauges and hose discharge.

2.5 EMERGENCY AID SPECIALTIES

- A. Defibrillator cabinet: Semi-recessed stainless steel cabinet, 14 inches by 14 inches by 6 inches equal to Phillips Model No. "AMP180RM".
- B. Automated External Defibrillator:
 - 1. Basis of Design: Philips Heart Start OnSite HS1 Defibrillator.
 - 2. Defibrillator Model: Automatic external defibrillator with adult defibrillation peak current of 32A (150J nominal) into a 50 ohm load and pediatric defibrillation peak current of 19A (50J nominal) into a 50 ohm load, complying with AAMI DF80 guidelines and AHA recommendations for adult defibrillation equal to Phillips Model "HeartStart M5066A".
 - a. Capacity: Minimum 200 shocks or 4 hours of operating time.
 - 3. Unit includes:
 - a. Defibrillator unit.
 - b. Battery: 9 Volt DC, 4.2 Ah disposable long-life lithium manganese dioxide primary cells equal to Phillips Model No. M5070A, pre-installed.
 - c. Adult pads cartridge equal to Phillips Model M5071A.
 - d. Infant/Child pads cartridge equal to Phillips Model M5072A.
 - e. Quick reference guide.
 - f. Setup and maintenance guide with expiration date tags.
 - g. Owner's Manual.
 - 4. Accessories:
 - a. Adult training pads cartridge equal to Phillips Model M5073A.
 - b. Infant/Child training pads cartridge equal to Phillips Model M5074A.
 - c. Data Recording and Transmission: Infrared IrDA protocol
 - d. Alarm: Standard key activated alarm, activated when door is opened to remove the defibrillator; 120db.

2.6 FIRE VALVE CABINETS

- A. Recessed steel valve cabinet, equal to Larsen Manufacturing Co., "Architectural Series", model N°. VC S2626-R, consisting of the following characteristics:
1. Trim style and projection: Recessed - 5/16 inch.
 2. Door style: Full acrylic.
 3. Inside box dimensions : 26 by 26 by 8 inches.
 4. Outside trim dimensions: 29½ by 29½ inches.
 5. Rough Opening: 27 by 27 by 8¼ inches.
 6. Interior capacity: (1) 2-1/2 inch valve with cap and chain.

2.7 SAFETY DATA SHEETS STORAGE CABINETS

- A. Wall mounted cabinet at each fire extinguisher location in the Auto/Diesel Shop and Science labs for protection and storage of safety data sheets complying with the following requirements
1. Material: 20 gage steel, minimum.
 2. Color: Manufacturer's standard safety yellow.
 3. Operation: Door held closed with integral magnetic catch.
 4. Mounting: Wall mounted at rear of cabinet.
 5. Accessories: 2-1/2 inch thick binder to hold safety data sheets in number required for documents at each location.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Accurform, Brooksville, FL, model "ZRS390".

2.8 SIGNAGE

- A. Identification Plaque: Provide sheet metal plaques, wall-mounted above each fire extinguisher and defibrillator cabinet and visible from 3-directions, to identify fire extinguisher locations. Sheet metal shall match material gage and finish of cabinet, and shall be approximately 18 inches high by 7 ½ inches wide. Pressure sensitive adhesive-applied red vinyl letters shall spell "FIRE EXTINGUISHER" or "DEFIBRILLATOR" as applicable; font and size shall be as selected by Architect.
1. At all cabinets with fire blankets provide additional "Stop, Drop and Roll" signage of similar design as identification plaques.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Verify that prepared openings are ready to receive extinguisher cabinets.
- C. Beginning of installation means acceptance of project conditions.

3.2 INSTALLATION

- A. Install fire extinguisher cabinets in accordance with manufacturer's instructions in locations indicated, and as additionally directed by regulatory authority having jurisdiction.
 - 1. Provide cabinets for locations as indicated, and as additionally directed by Architect and local regulatory authority.
- B. Do not commence installation of fire extinguisher cabinets until immediately adjacent surfaces have been completely installed and finished.
- C. Install cabinets absolutely level and in true line, with units securely anchored to the surrounding construction. Fit trim pieces accurately and tight to adjacent construction.
 - 1. Maximum variation from plumb and level: 1/8 inch.
 - 2. Maximum offset from true dimensional alignment: 1/4 inch.

3.3 CLEANING AND ADJUSTMENT

- A. Upon completion of the work of this Section in any given area, remove tools, and all packaging and debris from the work area; leave area in broom-clean condition.
- B. After adjacent work is complete:
 - 1. Test each door and latching device, and make adjustments required to ensure a bind-free operation and proper latching.
 - 2. Remove all tape and other packing materials from fire extinguisher cabinets .
 - 3. Thoroughly clean and polish all exterior and interior surfaces of extinguisher cabinets, take care to remove dirt from corners. Clean metal and [glass] [plastic] surfaces with mild cleaning agents as recommended by manufacturer.
 - 4. Touch-up all scratches and other surface defects, using same materials and colors as shop finish.

End of Section

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Section 10 51 13
METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of furnishing and installing metal lockers with all required closures, filler pieces where shown on the Drawings, as specified herein, for a complete and proper installation. Work includes, but is not limited to:
1. Locker Type 1 - Double tier, sloped-top, ventilated metal lockers at Corridors and Andy's Attic.
 2. Locker Type 2 - Double tier, sloped-top, ventilated metal lockers at Locker/Team Rooms, Auto/Diesel Shop and Culinary Arts and Kitchen.
 3. Locker Type 3 - Single tier, sloped-top, ventilated metal lockers at Locker/Team Rooms and Custodian.
 4. Five percent (5%) of the total number of each locker type or a number in accordance with applicable code requirements shall be accessible and located by the Architect.
 5. Locker room benches.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Wood bases, wood sleepers and blocking behind corridor lockers.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 2. Warranty: Provide sample copies of manufacturers' actual warranties, clearly defining all terms, conditions, and time periods for the coverage thereof.
 3. Shop drawings:
 - a. Plans, at scale to match Contract Drawings, of each area with specified lockers, include layout of all lockers, closures, and filler panels and large scale details of locker construction; and details of accessory items. Plans shall show locker number sequence.
 - b. Large scale details of locker construction, showing filler panels, sloping top components, attachment clips, brackets and complete installation details.
 4. Selection samples: Manufacturer's color chips, comprising at least 8 different colors, for selections by the Architect.
 5. Verification samples: Color chips of custom colors to match Architect's sample.
 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

- f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
 - B. Submit manufacturer's warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- 1.4 QUALITY ASSURANCE
 - A. Obtain lockers from a single manufacturer, or from manufacturers recommended by the prime manufacturer of lockers.
 - B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
- 1.5 QUALIFICATIONS
 - A. Manufacturer, with a minimum of 3 years experience demonstrating previously successful work of the type specified herein.
- 1.6 DELIVERY, STORAGE AND HANDLING
 - A. Do not order or fabricate lockers, until all specified submittals have been submitted to, and approved by, the Architect.
 - B. Store lockers inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- 1.7 SEQUENCING AND SCHEDULING
 - A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
 - B. Coordinate schedule of construction, size of access and route to place of installation to prevent delay of installation due to physical impediments. Any work involving the demolition and reconstruction of partitions, walls, floors, roofing, windows, or doors to place and install the work of this Section shall be performed at no additional cost to the Owner.
- 1.8 EXTRA MATERIALS
 - A. Upon completion of the Work of this Section, under provisions of Section 01 78 00 – CLOSEOUT SUBMITTALS, deliver to the Owner extra materials for future repairs and maintenance.
 - 1. Furnish replacement locker doors and hardware for 5 percent of each type and color of locker specified, but not less than one of each type.
 - 2. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Penco Products, Inc., Oaks, PA, product, "Guardian Plus"
- B. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Penco Products, Inc., Oaks, PA.
 - 2. Lyon Metal Products, Inc., Aurora, IL.
 - 3. List Industries, Inc., Deerfield Beach, FL.

2.2 MATERIALS

- A. Sheet Steel: Mild cold-rolled and leveled steel, free from buckle, scale, and surface imperfections.
- B. Expanded Metal: 3/4 inch mesh flattened carbon steel, 13 gage minimum.
- C. Fasteners: Cadmium, zinc, or nickel plated steel; exposed bolt heads, slotless type; self-locking nuts or locker washers for nuts on moving parts.
- D. Equipment: Hooks and hang rods of cadmium-plated or zinc-plated steel or cast aluminum.

2.3 LOCKER TYPES

- A. Locker Type 1: Double tier wardrobe locker 15 inches wide by 12 inches deep by 72 inches high at front.
- B. Locker Type 2: Double tier wardrobe locker 12 inches wide by 12 inches deep by 72 inches high at front.
- C. Locker Type 3: Single tier wardrobe locker 18 inches wide by 18 inches deep by 72 inches high at front.
- D. Locker Type 4: Single tier wardrobe locker 15 inches wide by 12 inches deep by 72 inches high at front.

2.4 LOCKERS GENERAL (ALL TYPES)

- 1. General design, equal to Penco Products, Inc., Oaks, PA, product: "Guardian Plus Lockers".
- 2. Body: Sides and backs minimum 24 gage. Tops, bottoms, shelves and sides minimum 16-gage. Flange tops, bottoms and shelves on four sides, and backs on two sides.
 - a. Form exposed ends of lockers of minimum 16-gage steel.
 - b. Top shelf:
 - 1) Standard locker: Manufacturer's standard height.
 - 2) Handicapped accessible locker: 48 inches above finished floor.

3. Door frame and cross members: 16 gage channel with continuous door stop/strike integral with frame on both sides of opening.
4. Door: Flush design, double wall construction, with louvers top and bottom, 14 gage steel, formed with full channel shape on lock bar side, channel formation on hinge side and flanged top and bottom. Fabricate to swing 180 degrees.
5. Hinges: Three 5 knuckle, 2 inch high full loop pin hinge welded to frame and riveted to inside of door flange.
6. Door handle:
 - a. Latch design: operable by "club fist" required by Massachusetts Architectural Access Board Regulations.
 - b. Latching method: Two point latching with spring steel latch contained in a lock bar under tension. Lock bar contained in door channel by self-lubricating polyethylene guides. Provide frame hooks welded to door frame, furnished with soft rubber silencers at each hook.
 - c. Lock method: Hasp to receive Owner furnished padlocks.
7. Accessories:
 - a. Double prong hook mounted to underside of locker top or back of locker.
 - b. Single prong hook mounted on each side of locker.
8. Base: Fire retardant treated wood base and sleepers provided under Section 06 10 00 – ROUGH CARPENTRY.
9. Sloping tops: 18 gage steel minimum having a sloped rise approximately 18 to 25 degrees, finished to match lockers, in lengths as long as practicable, but not less than 4 lockers. Provide closures at ends finish to match lockers.
10. Filler panels: 16 gage steel minimum, factory-fabricated and finished to match locker units.
11. Trim: 18 gage steel minimum finished to match lockers. Secure with concealed fasteners.
12. Accessories:
 - a. Number Plates: Provide each locker door with polished aluminum number plate with black numerals not less than 1/2 inch height.

2.5 LOCKER ROOM BENCHES

- A. Fixed-in-place benches (permanent), factory fabricated:
 1. Typical tops: Laminated maple, 9-1/2 inches wide by 1-1/4 inches thick of lengths indicated, sealed and varnished.
 2. Accessible tops: Laminated maple, 24 inches wide by 48 inches by 1-1/4 thick, sealed and varnished.
 3. Pedestals chromed-steel tubing, 1 inch inside diameter with 10 gage flanges welded to each end.
 4. Overall seating height shall be between 17-1/2 to 18 inches.

2.6 FACTORY FINISHING

- A. Clean, degrease, and neutralize metal; prime and finish with manufacturer's standard 2 mil thick minimum powder coat baked enamel finish:

1. Colors:
 - a. Paint locker bodies and doors in (4) custom colors as selected by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as indicated on reviewed and approved shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. During the operation of work of this Section, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged and soiled to match original finishes.

3.3 INSTALLATION

- A. Do not commence installation of lockers until immediately adjacent surfaces have been completely installed and finished.
- B. Perform installation work in accordance with the approved shop drawings and the manufacturer's installation instructions.
- C. Furnish and install all sloped top pieces as required, refer to the Drawings for the various conditions.
- D. Furnish and install all filler pieces as required and to align with ends of partitions. Refer to the Drawings for the various conditions.
- E. Set lockers absolutely level and in true line, with units bolted together and to the surrounding partitions, to provide a rigid and secure installation. Conceal screw heads and bolts as far as practicable, leaving exposed panels completely free from unused bolt holes.

3.4 ADJUSTING AND CLEANING

- A. Test each door and latching device, and make adjustments required to ensure a bind-free operation and proper latching.
- B. Remove all tape and other packing materials from locker surfaces, and thoroughly clean and polish all exterior and interior surfaces.
- C. Touch-up all scratches and other surface defects, using same materials and colors as shop finish.

3.5 PROTECTION

- A. Protect locker finish surfaces and hardware from damage until Owners Final Acceptance.

End of Section

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Section 10 81 13
BIRD CONTROL DEVICES
(TRADE CONTRACT REQUIRED AS PART OF SECTION 05 00 01)

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

- A. Trade Contract Requirements: As provided under Section 05 00 01 – MISCELLANEOUS AND ORNAMENTAL IRON TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.
 - 1. Work of this Trade Contract includes all individual specification sections listed in Section 05 00 01.

1.2 SUMMARY

- A. Furnish and install non-electrified post and wire anti-roosting bird control system at Main Entry canopies and elsewhere as indicated on Drawings to prevent large bird (pigeons & seagulls) roosting.

1.3 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 04 20 00 - UNIT MASONRY.

1.4 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM A 167 – Specifications for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 2. ASTM B 221 – Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
 - 3. ASTM B241 – Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Pipe.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Field Measurements
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.6 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Power source cut sheet.
2. Shop Drawings:
 - a. 1/4 inch plans indicating locations of bird control devices.
 - b. Include large scale details of items of all bird control devices to be furnished hereunder, showing proposed methods of anchorage to surrounding structure and conditions.
3. Verification Samples:
 - a. Fabricate a sample showing a typical section of bird control. Sample section shall be minimum 24 inches in horizontal length having both end and intermediate stanchions.
4. Manufacturer's Instructions: Manufacturer's written installation instructions.
5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - f. Include submittal documentation requirements for MR Credit 2 Building Product Disclosure and Optimization – Environmental Product Declaration for EPDs.
- B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- 1. Bonds and Warranty Documentation:
 - a. Manufacturer's Warranties and Guarantees as specified elsewhere herein this Section.
- 1.7 QUALITY ASSURANCE
- A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.
 - B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of bird control system.
 - C. Qualifications:
 - 1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
- 1.8 MOCK-UPS
- A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.
 - B. Locate mock-ups where directed and include all surfaces and materials scheduled to receive a field applied finish.
 - C. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
 - D. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1.9 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:

1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.10 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

B. Manufacturer Warranty: In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

C. Special Warranty: The Installer shall guarantee workmanship, materials and effectiveness of installation for a period of not less than five years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Nixalite of America, Inc., East Moline IL., product "FliteLine".

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. BirdMaster Inc., Billerica, MA.
2. Bird-X, Inc., Chicago IL.
3. Nixalite of America Inc., East Moline IL.
4. Tenax Corporation, Baltimore, MD

2.2 BIRD CONTROL COMPONENTS

- A. Post mounts: Stainless steel posts for two wire system, with stainless steel base.
 - 1. Provide in two heights (3-1/2 and 5 inches high).
- B. Cable: Maximum 1/32" diameter nylon jacketed stainless steel cable.
 - 1. Provide with tension springs.
- C. Fasteners:
 - 1. Screws shall be non-magnetic Type 302/304 stainless steel, of type and size to suit substrate.
 - 2. Adhesive attachments are prohibited.
- D. Provide specialized tools as may be necessary for attachment hardware.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Verify clearances required for bird control devices.
 - 2. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Thoroughly clean substrate surfaces prior to installation; remove all bird droppings, oil, grease, dirt, dust, loose paint and debris.
 - 1. Bird droppings shall be removed in a safe manner; large quantities shall be removed and disposed of by reputable waste removal companies.
- B. Remove or repair articles that may damage the bird netting after installation, such as tree limbs, brush, and loose parts of the building.
- C. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all existing surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

3.3 INSTALLATION

- A. Install bird control devices in strict accordance with Manufacturers' written instructions. Install using anchorage methods appropriate for substrate. Provide number of parallel rows as recommended by manufacturer.
 - 1. Evenly space rows at a maximum of 3 inches on center.
 - 2. Space anchor posts not to exceed 10 feet.

3. Space guide posts at even spacing not to exceed 5 feet on center.
 - B. Install wire in a "tight-as-a-drum" manner to insure a secure, long-lasting installation that is very hard to see from 20 feet. Provide one tension spring per run of cable from anchor post to next anchor post (maximum 10 foot run).
- 3.4 ADJUSTMENT
- A. Visually inspect netting for poor adherence to mounting surfaces, or other problems related to poor installation or surface preparation. Repair or adjust as necessary immediately.
- 3.5 CLEANING
- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- 3.6 PROTECTION
- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

Section 11 06 10
STAGE RIGGING AND CURTAINS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from General Contractor's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

1.3 SUMMARY

- A. Section Includes
 - 1. Single-purchase counterweight rigging system
 - 2. Stage traveler track assemblies
 - 3. Pipe battens
 - 4. Electric batten cable management
 - 5. Acoustic ceiling panels
 - 6. Stage curtains
 - 7. Accessories
- B. Product Installed But Not Supplied Under This Section:
 - 1. Electric batten connector strips
- C. Products Supplied But Not Installed Under This Section
 - 1. The following equipment shall be supplied and put in place under this section, but terminated under Division 26
 - a. Locking rail strip light and dimmers
- D. Related Sections
 - 1. Section 265000 – Stage and House Lighting and Controls
 - 2. Division 26

1.4 BID SUBMITTALS

- A. Qualifications
 - 1. Bidder shall be a system contractor, normally engaged in the full time business of rigging system installation. Provide evidence that the bidder has been in business for at least five years prior to bid date and has completed projects of similar size and scope.
 - 2. References, including names and telephone numbers of individuals who may be contacted, showing satisfactory completion of five or more projects similar in scope and type to that specified herein.

3. Evidence of ability and affirmation of intent to meet the guarantee and service requirements stated herein.
4. Each vendor shall include a description of the professional and technical experiences background, qualifications and expertise of the organization's key personnel assigned to this project. The description shall show that bidder possesses the demonstrated skills and experience in specific areas of the project scope. In addition, Bidder shall identify a project manager for the project and shall provide resumes of all personnel who shall be assigned to this project. Bidder shall estimate the percentage of time each individual shall be working on this project.

B. Alternates

1. With system bid price, submit prices for equipment and installation of additional or reduced quantities of equipment as stated herein. Unless otherwise stated, all items herein are part of the base bid system.

C. Substitutions

1. Any request for a substitution for a specified product or material must be made, in writing, to the Architect. Such requests must not impact the project schedule.
2. Substitution requests will only be accepted if the Architect deems the product or materials to be an equal to the specified product. No substitutions may be made without written authorization from the Architect.
3. Any and all additional expenses incurred as a result of a requested substitution shall be borne solely by the Contractor. These expenses may include, but not be limited to, all fees and expenses incurred by the Architect in evaluating the substitution and additional costs to other contractors incurred by the substitution.

1.5 DEFINITIONS

- A. Furnish – Purchase and/or fabricate the item and deliver to site.
- B. Install – Perform the physical installation of the item on the site.
- C. Provide – Furnish and install item or items, complete with any and all required accessories.

1.6 SYSTEM DESCRIPTION

A. Auditorium

1. Single-purchase counterweight rigging system.
2. Stage travelers, track and accessories.
3. Acoustic ceiling panels
4. Masking drapery.
5. Cable management accessories.

1.7 SUBMITTALS

- A. Provide submittals in accordance with requirements of Section 013300 - Submittals.
- B. Product Data
 1. Submit manufacturer's product data for standard hardware including wire rope compression sleeves, turnbuckles, shackles and wire rope.
- C. Shop Drawings
 1. Shop drawings shall be submitted in an expeditious manner. The timing of the submittal shall allow sufficient time for review, revision and resubmittal without impacting the project schedule.
 2. Shop drawing sheet size shall be uniform with a minimum size of 24" x 36"

3. Shop drawings shall include all of the following, as applicable:
 - a. 1/4"=1'-0" scale plans and elevations including locations of electrical and control system components
 - b. Electrical riser and wire termination diagrams
 - c. Assembly drawings of all major components including weights, dimensions and finishes.
 - d. Calculations of weight and loading bearing capacity of individual components and the full system. Indicate ultimate breaking strength and safety factor for all rigging components.
 - e. Component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
 - f. All rigging drawings shall be stamped by a licensed professional engineer. The engineer shall verify that the equipment supplied under this section meets or exceeds the design criteria set forth in this specification and on the Drawings.
 - g. Space for review stamps and comments.
 - h. Complete list of all draperies indicating material, fullness, color, size and finishing details.
 - i. 24 inch by 24 inch swatch of each fabric in the system.
 4. Approval of the shop drawings does not relieve the Rigging Contractor of the responsibility of providing equipment in accordance with the specifications.
- D. Quality Assurance/Control
1. Verify wire type, conduit size, and power requirements for all electrified elements in system.
- E. Closeout Submittals
1. Submit documents in accordance with Division 1.
 2. Within 45 days of acceptance testing, submit the following:
 - a. One set of reproducible as-built drawings. These drawings shall include all adjustments made during the installation and acceptance testing processes.
 - b. Upon completion of commissioning, the Contractor shall submit 3 copies of a detailed Operating and Maintenance Manual including as-built shop drawings, equipment descriptions, and parts lists. The Contractor shall go through the manual with personnel designated by the owner to demonstrate and explain the maintenance and operation of the systems.
 - c. Draperies:
 1. Cleaning instructions.
 2. Compiled list of all periodic maintenance required for all components of the system.
 3. Original signed and notarized certificates with each fabric used affirming the fabrics satisfy all applicable codes.
- 1.8 QUALITY ASSURANCE
- A. Qualifications
1. The Contractor shall have a valid Contractor's License at the time of bid and throughout the project.
- B. Pre-Installation Meetings

1. Attend coordination meetings as required to ensure installation is coordinated with other trades.
 - C. All draperies shall be the fabricated by a single theatrical drapery contractor.
- 1.9 DELIVERY, STORAGE, AND HANDLING
- A. Packing, Shipping, Handling, and Unloading
 1. All shipping and trucking costs are the responsibility of the Contractor. Method of shipment is at the discretion of the Contractor.
 - B. Acceptance at Site
 1. Coordinate delivery and acceptance with the Construction Manager.
 - C. Storage and Protections
 1. Protect all equipment from damage and deterioration during all phases of work.
- 1.10 PROJECT CONDITIONS
- A. Existing Conditions
 1. Verify all existing conditions and dimensions at the project site prior to preparing submittal drawings.
 2. Verify final drapery dimensions in field prior to fabrication.
- 1.11 WARRANTY
- A. The Rigging Contractor shall provide a two year written guarantee against defects in materials or workmanship. The warranty period shall start from the date of acceptance of the work by the Owner's Designated Representative. Any required maintenance or replacement shall be provided by the Contractor within fifteen days of notification by the Owner, except for safety related items, which shall be corrected within 48 hours of notification.
- 1.12 COMMISSIONING
- A. Upon completion of the work, notify the Architect in writing that the system is ready for commissioning.
 - B. During commissioning the Owner's Designated Representative will verify that system operation is per specifications. Provide a representative on-site to assist in the commissioning of the system and fix minor problems as they are discovered.
- 1.13 OWNER'S INSTRUCTION
- A. Provide in-depth training of the user's staff in the operation of system.
 - B. All training shall be performed by the staff of Contractor.
 - C. Signage with basic operating instructions and warnings shall be posted in the area where the equipment will be operated. Signage shall be in conformance with ANSI-Z535.
- 1.14 MAINTENANCE
- A. Extra Materials
 1. Provide maintenance materials to the Owner as required for routine maintenance of system and components for two years, including, but not limited to:
 - a. Lubricants

- b. Torque wrench
 - c. Spare bolts, washers and nuts
 - d. Spare padlock
- B. Maintenance Services
- 1. One year after acceptance testing a technician shall return to the project site to inspect, adjust and repair the system. All labor and materials required to perform this service shall conform to these specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Equipment Manufacturers
- 1. J.R. Clancy
 - 2. H&H Specialty
 - 3. Texas Scenic
 - 4. Secoa
 - 5. Pook, Deimont and Ohl
- B. Drapery Manufacturers
- 1. Stage Decoration and Supply
 - 2. Rosebrand
 - 3. Major Theatre Equipment

2.2 MATERIALS

- A. Materials shall conform to the following ASTM and ANSI standard specifications:
- 1. A-36 -Specification for structural steel
 - 2. B18.2.1&2 - Specification for square and hex bolts and nuts
 - 3. B 106.1M – Design of Transmission Shafting
 - 4. B 17.1 – Keys and Keyseats
- B. All overhead rigging elements including but not limited to mounting hardware, wire rope, wire rope fittings, and shackles to be designed to a safety factor of 10 times their rated breaking strength.
- C. Cable Fittings:
- 1. Cable clips shall conform to wire rope manufacturer's recommendations as to size, number, and method of installation. Clips shall be drop forged "Crosby" or approved equal. Under no circumstances may malleable cable clips be used in suspension or lifting lines.
 - 2. Swaged sleeve fittings shall be copper "Nicopress" or equal. Swaged fittings shall be installed per the fitting manufacturer's instructions, using the appropriate tools, and checked with a "Go - No go" gauge.
 - 3. Eyes shall be formed over galvanized wire rope thimbles of correct sizes.
- D. All turnbuckles and shackles shall be drop forged and galvanized.
- E. Draperies
- 1. Provide vat-dyed fabrics that are inherently flame-resistant or fully flame retardant in accordance with NFPA 701 (2015) and the International Building Code.

2.3 FABRICATION

- A. Fabrication Tolerances
1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard or any sharp corners accessible to personnel.
 2. All equipment shall be built and installed to facilitate future maintenance and replacement.
- B. Drapery
1. Provide all fabric cuts with full length; no splices.
 2. Provide draperies with sewn fullness and fabric types as indicated in the Drapery Schedule.
 3. Remove all drapery fabric from bolts and inspect on illuminated (100 foot-candle minimum) table for flaws and imperfections. Cut out flawed section prior to sewing final product.
 4. Provide all draperies with heavy-duty polyester webbing with a minimum weight of 2.8 oz per yard, double stitched as the top 2-3/4 inches apart and having machine set black anodized grommets on one foot centers.
 5. Floor length draperies will have a six (6) inch bottom hem with suspended inner pocket containing #8 zinc coated chain weight. Lead tape, or any other toxic substances, shall not be incorporated into any product in this section. Leading hems of traveler curtains will use one-half width turnback. All other side hems will be two (2) inches.
 6. All linings (where applicable) for draperies shall be attached to the face material by adjustable black hook-and-loop tape (one inch wide) and approximately 10" long, in two 5" sections arranged to be concealed from the face side. Tape sections are to be located at approximately 36" spacing along the bottom and 24" at the sides. Attach tapes to edge of vertical facebacks and top of bottom hem with mates attached to edge of lining.
 7. Provide drapery lining with the same fullness as the face fabric and finish 2" shorter than the face fabric. Sew 10 inch bottom hem of lining to allow for shrinkage.
 8. All draperies operating from traveler tracks shall have oblong spring, carabiner type snaps for each grommet location. All other draperies shall have black No. 4, 36" tie lines, knotted and tied.
 9. Prior to sewing the bottom hem, the otherwise completed drapery sections shall be hung full height to their finished width and allowed to hang untouched for two weeks (minimum) after which the bottom shall be scribed and hemmed to the specified finished height. Scrims/Cycloramas shall have a pipe pocket in bottom hem. Scrims shall be finished at the top per above instructions and the bottom hem shall be six inches wide with an inner pocket pipe pocket.

2.4 FINISHES

- A. Clean structural steel and fabricated steelwork of rust, scale and foreign matter by grinding. Finish steel with 1 coat of primer and 1 coat of enamel. Final finish shall be free of skips and runs. Touch up all field connections, welds and abraded areas after installation with primer and enamel.
- B. All painted finished to be low-sheen black unless otherwise noted.

2.5 COUNTERWEIGHT RIGGING SYSTEM

- A. Arbor Guide Track
1. Guide material: Extruded aluminum J-channel
 2. Wall batten material: 1-3/4 inch by 1-3/4 inch by 3/16 inch steel angle with factory punch holes for attachment of aluminum guide clips.
 3. Wall knee material: 5/16 inch by 1-1/2 steel knee and 11 gauge 1 inch by 2 inch formed slotted channel.

4. Top and bottom arbor stop: 1-3/4 inch by 1-3/4 inch by 3/16 inch steel angle with hardwood bumper.
- B. Counterweight Arbor
1. Provide counterweight arbor that can be loaded with weight from the front of the arbor with ANSI E1.4.1 compliant counterweight bricks.
 2. Provide unit with latching compartments to comply with SEA J839 and FMVSS 206.
 3. Arbor housing material: 12-gauge steel
 4. Arbor height: per Schedule
 5. Provide with guide shoes.
 - a. J.R. Clancy FrontLoader or equal.
- C. Counterweight
1. Material: Flame or laser cut steel plate. Chamfer opposite corners
 2. Width: 6 inches
 3. After balancing system for pipe weight, distribute 90% of remaining weight evenly on the loading gallery. Leave remaining 10% of weight at stage level.
 4. Pipe Weight: paint counterweights to be used as pipe weight blue.
 5. Quantity
 - a. Provide 50 percent of total arbor capacity of system.
 - b. Provide 80 percent of weight two inches thick and 20 percent 1 inches thick
- D. Lift Line
1. Material: 1/4 inch 7x19 galvanized wire rope
 2. Ultimate breaking strength: 7,000 pounds
 3. Damaged or deformed cable shall not be used.
 4. Install all wire rope rigging so as to prevent abrasion of the wire rope against any obstruction.
- E. Hand Operating Line
1. Material: 3/4 inch diameter SureGrip
 2. Color: white
 3. Arbor attachment: bowline knot and two half-hitches
 4. Tape all cut ends to prevent fraying.
- F. Locking Rail
1. Rope lock and card mounting material: 3-1/2 inch by 5 inch by 1/4 inch steel angle.
 2. Provide onstage edge of rail sloped and punched to receiver index card clips. Install clips to center cards on installed line sets.
 3. Provide one numbered plastic write-on card for each installed set.
 4. Provide 10 percent spare stock of index cards.
 5. Stanchion material: 2 inch square steel tube.
 6. Stanchion spacing: maximum five feet on center
 7. Provide expanded steel mesh to cover zone between rail and floor. Secure to stanchions.
 8. Maximum upload: 500 pounds per foot.
- G. Rope Lock
1. Housing material: ASTN A536 ductile iron
 2. Handle size: nine inches
 3. Handle coating: nylon powder or vinyl dip.
 4. Safety: coat oval welded steel ring
 5. Housing shall allow use of standard padlock to hold handle in closed position.

6. Lock shall perform all operations quietly. Install rubber bumper on housing to reduce noise when handle is opened.
 7. Hand operating line range: 5/8 inch to 1 inch
- H. Padlock
1. Provide one padlock for each Rope Lock in system.
 2. Provide all padlocks keyed alike.
- I. Tension Block
1. Sheave material: ASTM A48 Class 30 cast iron or steel
 2. Outer diameter: 10 inches
 3. Side plate material: 3/16 inch plate steel, minimum
 4. Minimum weight: forty pounds
- J. Head Block
1. Sheave material: Nylatron or steel
 2. Outer diameter: twelve inches
 3. Side plate material: 10 gauge steel, minimum, with minimum of six bolts and spacers between side plates.
 4. Double purchase.
 5. Working load limit: 2,500 pounds
 6. Hardware: attach to structural steel
- K. Single Line Loft Block
1. Sheave material: Nylatron or steel
 2. Outer diameter: eight and one half inches
 3. Side plate material: 12 gauge steel, minimum, with minimum of seven bolts and spacers between side plates.
 4. Working load limit: 700 pounds
 5. Hardware: attach to structural steel
 6. Idlers: Mount Nylatron pulleys to side of loft block to support lift lines as required.
- L. Multi-line Loft Block
1. Sheave material: Nylatron or steel
 2. Outer diameter: eight and one half inches
 3. Side plate material: 10 gauge steel, minimum, with minimum of seven bolts and spacers between side plates.
 4. Working load limit: 1,300 pounds
 5. Hardware: attach to structural steel
- M. Index Rail Strip Light
1. Description: Sheet steel housing with medium screw base porcelain lamps sockets on 12 inch centers.
 2. Wiring: Sockets wired alternately with leads and junction box at either end of strip.
 3. Finish: painted matte black
 4. Provide with dimmable 6W A19 LED lamps, alternating white frosted and blue frosted.
 5. Suspend from outrigger batten.
 6. Length: full length of locking rail.
- N. Index Rail Strip Light Dimmer
1. Electronic wall dimmer suitable for use with LED lamps in Index Rail Strip Light
 2. Capacity: As required by length of index rail strip light.
 3. Provide with back box as required for surface mounting.
 4. Quantity: 2

- O. Outrigger Bracket and Batten
 - 1. Bracket material: 3/16 inch by 1-3/4 inch by 1-3/4 inch angle.
 - 2. Batten material: 1-1/2 inch nominal schedule 40 black steel pipe
 - 3. Finish: painted matte black
 - 4. Attach bracket to wall battens of counterweight arbor guide.
 - 5. Suspend batten 10 feet above finished stage floor.

- P. Labeling
 - 1. Provide line set designation:
 - a. Onstage face of locking rail
 - b. Bottom flange of head block beam, readable from loading gallery
 - c. Pipe ends
 - 2. Provide signage indicating system load data including live and total load capacity for line sets and weight for each size of counterweight in system.
 - a. Stage Level
 - b. Loading Gallery

2.6 ELECTRIC BATTEN CABLE MANAGEMENT

- A. Provide cast iron cable cradle with 8 inch diameter Nylatron or steel sheave secured to cradle with 1/8 inch steel plate on both side of cradle.

- B. Coordinate with Theatrical Lighting Contractor for quantity and size of electrics multi-cable.

2.7 PIPE BATTENS

- A. Batten
 - 1. Material: 1-1/2 inch nominal pipe thread (NPT) schedule 40 steel pipe.
 - 2. Sleeve: 24 inch long sleeve equally spaced around joined with two 3/8 inch hex head bolts and locking nuts perpendicular to each other on each side of joint.
 - 3. Finish: flat black enamel
 - 4. Ends: cover with brightly colored, closed end vinyl cap. Minimum length: 4 inches.
 - 5. Label pipe at each end, facing upstage and downstage, with pipe number.
 - 6. Center mark: 1 inch wide yellow stripe on stage centerline

- B. General Purpose Batten Lift Line Attachment
 - 1. Trim chain: 36 inch long 1/4 inch grade 30 proof coil chain with copper compression fitting and thimble at cable attachment. Wrap chain one and a half times around pipe batten and attached to thimble with 1/4 inch forged cotter-pin shackle.
 - 2. Provide 3/8 inch diameter bolt, locking nut and washers. Secure trim chain after batten is leveled.

- C. Electric Batten Lift Line Attachment
 - 1. Connect to hanger bracket provided by Theatrical Lighting Contractor using copper compression sleeve, wire rope thimble and jaw/jaw turnbuckle.

2.8 DEAD-HUNG BATTEN

- A. Beam Clamp
 - 1. Provide beam clamp with two 7-gauge painted steel plates with cut-out as required to grasp beam flange.
 - 2. Provide beam clamp with 1/4" round pin anchor shackle for attachment to support line.
 - 3. Verify size of support steel in field before ordering beam clamp.

- B. Support Line
 - 1. Provide 1/4" 7x19 galvanized wire rope
 - 2. Minimum ultimate break strength: 7,000 pounds
 - 3. For General Purpose Battens: connect to pipe batten using copper compression sleeve, wire rope thimble, 24" length of 1/4" Grade 30 proof coil chain, and forged round pin shackle with cotter pin.
- C. Batten
 - 1. Material: 1-1/2 inch nominal pipe thread (NPT) schedule 40 steel pipe.
 - 2. Sleeve: 18 inch long sleeve equally spaced around joined with two 3/8 inch hex head bolts and locking nuts perpendicular to each other on each side of joint.
 - 3. Finish: flat black enamel
 - 4. Ends: cover with brightly colored, closed end vinyl cap. Minimum length: 4 inches.
 - 5. Center mark: 1 inch wide yellow stripe on stage centerline

2.9 STAGE TRAVELER TRACK ASSEMBLY

- A. Provide bi-parting line-operated curtain track per Drawings for stage travelers.
- B. Support traveler track with dead-hung line set.
- C. Track
 - 1. Material: 14 gauge 3 inch by 3 inch steel or aluminum channel
 - 2. Color: black
 - 3. Hanger: clamp to pipe batten
 - 4. Hanger spacing: 6 feet on center
 - 5. Center overlap: 3 feet
- D. Carriers
 - 1. Master carrier: one per traveler panel, each with four pairs of neoprene wheels attached to steel support plate.
 - 2. Single Carrier: Two heavy-duty neoprene wheels on ball-bearing attached to steel support plate.
 - 3. Trim chain: 4 inch long, attached to all carriers
 - 4. Provide back pack guide for all carriers.
- E. Pulley Blocks
 - 1. Dead end pulley: 8 inch diameter Nylatron sheave on ball bearing.
 - 2. Live end pulley: two 8 inch diameter Nylatron sheaves on ball bearings.
 - 3. Floor Pulley: 8 inch diameter Nylatron sheave on ball bearing with eight inches of height adjustment.
- F. Operating Line
 - 1. Material: 1/2 inch diameter braided black cotton cord with synthetic center in single, unspliced length.
- G. Product
 - 1. Automatic Devices Company Series 380 cord-operated bi-part curtain track
 - 2. H&H Specialties equal

2.10 ACOUSTIC CEILING PANEL

- A. General
 - 1. Acoustical shell ceiling consisting of adjustable-angle acoustical shell ceiling panels, suspended from stage rigging pipe batten, and stored in fly-loft in vertical position.

B. Suspension

1. Hanger Arms

- a. The integral truss provides the structure to allow 1 inch (25 mm) square 11 gauge steel hanger arms to be located next to the rigging cables which is the strongest point to support the weight of the ceiling assembly. Hanger arms that are located more than 2 inches (25 mm) from the rigging cables are not acceptable.

2. Ceiling Performance Angle Adjustment

- a. Spring-loaded steel tube assembly allows the ceiling to be easily locked into the performance position. The stay assembly shall be easily readjusted and marked to identify preferred preset angles.

C. Materials

1. Core: ¾ inch thick honeycomb, resin impregnated, bonded to frame and faces with permanent urethane adhesive.
2. Face: 3/16 thick hardboard with plastic laminate woodgrain finish selected from full line of manufacturer's available patterns.
3. Back: 3/16 inch thick hardboard, painted black
4. Edge frame: extruded aluminum edge angle, along straight edges.
5. Panel hinges: self-lubricating ABS bushings and steel framework.

D. Finishes

1. Aluminum Framing: Mill finish.
2. Steel Finish: Immediately after cleaning and pretreating, electrostatically apply thermosetting TGIC polyester powder coating.
3. Ceiling Panel Faces: Plastic Laminate to be selected by Architect

E. Size: per Drawings.

F. Radius: 10 feet

G. Basis of Design

1. Wenger Maestro Acoustical Shell
2. Equal
 - a. Quantity: 2

2.11 DRAPERIES

A. Main Valance

1. Material

- a. 26 ounce IFR velour
- b. 45 backing ends per inch
- c. 51 pile ends per inch
- d. 48 picks per inch
- e. 1148 pile tufts per square inch
- f. 120/1000 inch pile height
- g. Acceptable Products
 1. K-M Fabrics "Prestige"
 2. Equals by JB Martin, Gerriets or DeBall

2. Color: Selected from the approved manufacturer's complete selection of standard colors.
3. Hems: 4 inch side hems
4. Lining: Black IFR Avora

5. Fullness: Box pleats one foot on center, per Drapery Schedule
 6. Top Finish: Grommets and 36 inch knotted black tie lines on one foot centers
 7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.
- B. Main Traveler
1. Material
 - a. 26 ounce IFR velour
 - b. 45 backing ends per inch
 - c. 51 pile ends per inch
 - d. 48 picks per inch
 - e. 1148 pile tufts per square inch
 - f. 120/1000 inch pile height
 - g. Acceptable Products
 1. K-M Fabrics "Prestige"
 2. Equals by JB Martin, Gerriets or DeBall
 2. Color: Selected from the approved manufacturer's complete selection of standard colors.
 3. Hems
 - a. Offstage: 4 inch
 - b. Onstage: Half of width of fabric
 4. Lining Black IFR Avora
 5. Fullness: Box pleats one foot on center, per Drapery Schedule
 6. Top Finish: Grommets and oblong spring-closure carabineer on one foot centers
 7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.
- C. Leg
1. Material
 - a. 20 ounce IFR velour
 - b. 65 backing ends per inch
 - c. 51 pile ends per inch
 - d. 51 picks per inch
 - e. 1658 pile tufts per square inch
 - f. 130/1000 inch pile height
 - g. Acceptable Products
 1. K-M Fabrics "Crescent"
 2. Equals by JB Martin, Gerriets or DeBall
 2. Color: Black
 3. Hems: 4 inch side hems
 4. Lining: None
 5. Fullness: Box pleats one foot on center, per Drapery Schedule
 6. Top Finish: Grommets and 36 inch knotted black tie lines on one foot centers
 7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.
- D. Border
1. Material
 - a. 20 ounce IFR velour
 - b. 65 backing ends per inch

- c. 51 pile ends per inch
 - d. 51 picks per inch
 - e. 1658 pile tufts per square inch
 - f. 130/1000 inch pile height
 - g. Acceptable Products
 1. K-M Fabrics "Crescent"
 2. Equals by JB Martin, Gerriets or DeBall
 2. Color: Black
 3. Hems: 4 inch side hems
 4. Lining: None
 5. Fullness: Box pleats one foot on center, per Drapery Schedule
 6. Top Finish: Grommets and 36 inch knotted black tie lines on one foot centers
 7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.
- E. Stage Traveler
 1. Material
 - a. 20 ounce IFR velour
 - b. 65 backing ends per inch
 - c. 51 pile ends per inch
 - d. 51 picks per inch
 - e. 1658 pile tufts per square inch
 - f. 130/1000 inch pile height
 - g. Acceptable Products
 1. K-M Fabrics "Crescent"
 2. Equals by JB Martin, Gerriets or DeBall
 2. Color: Black
 3. Hems
 - a. Offstage: 4 inch
 - b. Onstage: Half of width of fabric
 4. Fullness: Box pleats one foot on center, per Drapery Schedule
 5. Lining: None
 6. Top Finish Grommets and oblong spring-closure carabineer on one foot centers
 7. Bottom Finish: 6 inch muslin chain pocket with #8 chain.
- F. Scrim
 1. Material: seamless flame-retardant sharktooth scrim
 2. Color: Black
 3. Hems: 3 inch side hems
 4. Lining: None
 5. Top Finish: Grommets and 36 inch knotted black tie lines on one foot centers
 6. Bottom Finish: 6 inch muslin pipe pocket behind bottom hem.
- G. Cyclorama
 1. Material: seamless bleached flame-retardant muslin
 2. Color: White
 3. Hems: 3 inch side hems
 4. Lining: None
 5. Top Finish: Grommets and 36 inch knotted black tie lines on one foot centers

6. Bottom Finish: 6 inch muslin pipe pocket behind bottom hem.

2.12 DRAPERY SCHEDULE

Description	Qty	Height	Width	Fullness	Notes
Main Valance	1	8'-0"	56'-0"	100%	Lined, Color TBD
Main Curtain	2	22'-0"	29'-6"	100%	Lined, Color TBD
Leg	8	24'-0"	9'-0"	Flat	Black
Border	4	8'-0"	56'-0"	Flat	Black
Stage Traveler	4	22'-0"	29'-6"	50%	Black
Scrim	1	23'-0"	56'-0"	Flat	Black
Cyclorama	1	23'-0"	56'-0"	Flat	White

2.13 PIPE WEIGHT

- A. Provide one inch nominal NPT pipe with threaded ends and coupling for full width of draperies with pipe pocket bottoms.
- B. Clean and paint fittings and pipe black.

2.14 STORAGE HAMPER

- A. Provide sixteen-bushel canvas storage hamper with steel frame, heavy-duty castors and hinged plywood top.
1. Steele Canvas Model 82
 2. Equal
 - a. Quantity: 2

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Only qualified personnel shall install the equipment in this Section.

3.2 EXAMINATION

- A. Site Verification of Conditions
1. The Contractor shall examine areas and conditions under which the equipment is to be installed and shall notify the Owner's Designated Representative in writing of conditions detrimental to the proper and timely completion of the work. If unsatisfactory conditions are present, do not proceed with work until they have been corrected.

3.3 INSTALLATION

- A. The Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.
- B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
- C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).

- D. Alignment: Mule blocks, cable rollers and guides shall be installed, as required, to provide proper alignment, to maintain specified fleet angles, and to prevent contact with other surfaces.
- E. Attachments: All equipment shall be securely attached to the building structure. Underhung blocks and mule blocks shall be welded in place unless otherwise directed.
- F. Secure ("mouse") all turnbuckles with bailing wire after adjustment.
- G. Finishes:
 - 1. All welds must be touched up to match disturbed finishes.
 - 2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.
- H. Drapery
 - 1. All materials to be flame-proofed to conform to local code.
 - 2. Allow all draperies to hang in place for 48 hours prior to inspection.
 - 3. Install drapery after stage house is fully climate controlled. Do not install draperies if there is a planned prolonged shut-down of the stage or auditorium climate control system before substantial completion.

3.4 FIELD QUALITY CONTROL

- A. Site Tests, Inspection
 - 1. Inspect all equipment for defects prior to installation.
 - 2. Upon completion of installation and wiring, test all system functions for complete operation.

3.5 CLEANING

- A. Touch up scratches as required.
- B. The Contractor shall be responsible for clean-up, including removal of all packing materials and the protection of surfaces and equipment provided by other contractors.

3.6 INSPECTION AND TESTING

- A. Inspection: During the installation of equipment the Contractor shall arrange for access as necessary for inspection of equipment by the Owner's Designated Representatives.
- B. System Inspection & Pre-Testing: On completion of installation and testing the Contractor shall conduct a complete pre-test of the system to ensure it is working properly and in conformance with this specification. This shall include a complete test of all electrical systems and components. All tests shall be conducted as if the Architect or Consultant were present and appropriate corrections made before the final inspection. Inspection shall be done using the rigging equipment manufacturer's written inspection forms.

3.7 DEMONSTRATION

- A. Upon system substantial completion, notify Architect, in writing, that system is ready for demonstration and inspection.
- B. Demonstrate operation of installed equipment for approval by the Architect and Owner.
- C. Make adjustments and modifications to the system as directed by the Architect and/or Owner.
- D. The cost of re-inspection and additional testing by the Architect, if required, due to lack of system completion and/or errors and omissions shall be borne by the Contractor or the

Construction Manager, depending on the area of work in question. Additional inspections and testing will be carried out on a time and expenses basis with standard hourly billing rates.

3.8 FOLLOW-UP INSPECTION

- A. One year after the completion of installation, the return to the site and provide the following services:
1. Complete inspection of the rigging system.
 2. Make all required adjustments.
 3. Correct all warranty items.
 4. Provide written recommendations for necessary repairs or changes not included in the warranty.
 5. Conduct a 1 hour rigging operation and safety class.
 6. Provide a written proposal for the next year's maintenance visit.

End of Section

Section 11 13 00
LOADING DOCK EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
1. Dock bumpers.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 - CAST-IN-PLACE CONCRETE:
1. Structural concrete and related formwork.
- B. Section 05 50 00 - METAL FABRICATIONS: Galvanized steel angle edgings in conjunction with loading dock.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, physical properties and installation instructions for each item furnished hereunder.
 - a. Indicate unit dimensions, method of anchorage and details of construction.
 2. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Submit manufacturer's warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1.4 SEQUENCING AND SCHEDULING

- A. Provide anchor bolts and coordinate their placement with the work Section 03 30 00 - CAST IN PLACE CONCRETE, responsible for installing anchor bolts for dock bumpers. Furnish anchors so as not to delay construction schedule.

1.5 WARRANTY

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.
- B. Manufacturer Warranty: In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Pawling Corporation, Wassaic, NY.
 - 2. Kelley, Carrollton TX.
 - 3. Rite-Hite Corporation, Milwaukee, WI.

2.2 DOCK BUMPERS

- A. Dock Bumpers: Nominal 10-inches high by 38-inches long by 4-1/2-inches thick, made from rubberized-fabric truck tires, and closed with two 3 by 2-1/2 by 1/4-inch galvanized steel angles under approximately 1,500 pounds pressure, and attached to the loading dock with 3/4-inch galvanized steel J-type anchor bolts, Model H1038, as manufactured by Pawling Corporation or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that anchor placement is in the proper locations to receive the work of this Section.
- B. Beginning of installation means acceptance of conditions.

3.2 INSTALLATION OF DOCK BUMPERS

- A. Coordinate the placement of anchor bolts with the work of Section 03 30 00 - CAST-IN-PLACE CONCRETE. Install rubber bumpers over anchor bolts, and secure the bumpers with hex nuts and washers through pre-drilled holes, ensuring that the bolt end and nut are recessed below the bumper surface.

3.3 CLEANING

- A. Upon completion of the work of this Section, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

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Section 11 13 20
PROJECTION SCREENS

PART 1 - GENERAL

1.0 GENERAL PROVISIONS

- . Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- A. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- B. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.1 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from General Contractor's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

1.2 RELATED DOCUMENTS

- A. Refer to AV series drawings and project architectural, structural and electrical drawings for information related to the work specified herein.
- B. Examine all Drawings and other Sections of the Specifications for requirements therein affecting the work of this trade.

1.3 SECTION INCLUDES

- A. Electrically operated projection screen, controls, accessories and mounting hardware.
- B. Fixed, recessed, electrically operated projection screen, controls, accessories and mounting hardware.

1.4 RELATED SECTIONS:

- A. Section 27 41 16 - Integrated Audio-Visual Systems and Equipment
- B. Section 11 06 10 – Stage Rigging and Curtains
- C. Division 26 – Electrical Work

1.5 REFERENCES

- A. Society of Motion Picture and Television Engineers (SMPTE):

1. SMPTE RP 94-2000 - Gain Determination of Front Projection Screens.

1.6 DEFINITIONS

- A. Gain: Indication of screen's luminance or brightness measured perpendicular of screen center and measured relative to a block of magnesium carbonate which serves as the standard for 1.0 gain. Higher numbers indicate greater brightness. Gain shall be determined in accordance with SMPTE RP 94-2000.
- B. Viewing angle: Angle from perpendicular center of screen at which the gain or brightness is decreased by 50 percent.
- C. Keystone: Distortion of projected image when screen is not perpendicular with center line of projected image.

1.7 COORDINATION

- A. Employ labor compatible with all on-site trades.
- B. Attend regular project meetings as scheduled by the General Contractor or Architect.
- C. Coordinate with the schedule of general construction work by others.

1.8 SUBMITTALS

- A. Provide in accordance with Section 0133000 - Submittal Procedures:
- B. Product data for projection screens and accessories.
- C. Shop drawings: Indicate dimensions, fabrication and installation details, and electric wiring diagrams.
- D. Samples:
 1. Finishes for selection by Architect.
 2. Viewing surface: 6 by 6 inches minimum size.
- E. Manufacturer's installation, operation, maintenance, and cleaning instructions.
- F. Site-specific installation and suspension details.

1.9 QUALITY ASSURANCE

- A. Manufacturer qualifications: Firm with 30 years minimum successful experience manufacturing electric projection screens.
- B. Motors for electric screens shall be certified by Underwriters Laboratory (UL), Inc. and shall bear UL label.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver projection screens after building is enclosed and construction in rooms where screens will be installed is substantially complete.
- B. Deliver screens in manufacturer's undamaged, labeled packaging.

PART 2 - PRODUCTS

2.0 GENERAL

All equipment and materials shall be new, latest version at time of bid, and shall conform to applicable UL, CSA or ANSI provisions. Re-manufactured or "B" stock equipment will not be accepted without prior written consent from the Owner. Evidence of unauthorized re-manufactured, or "B" stock equipment on the project site will be deemed evidence of the Contractor's Failure to Perform the Work. Care should be taken during installation to prevent damage (scratches, dents, chips, and disfiguration) to the equipment.

A. Accessories

1. Installation hardware: Provide all additional attachment hardware, fasteners, and other components of type, size, and spacing recommended by manufacturer for complete, functional, secure installation of electric screen.

2.1 LARGE MOTORIZED FRONT PROJECTION SCREEN, TENSIONED

A. Acceptable Manufacturers

1. Da-Lite, Inc.
2. Draper
3. Stewart Filmscreen

B. Screen

1. Type: Electrically operated, tensioned, retractable, projection screen for recessed use
 - a. Model: Tensioned Large Advantage Electrol
 1. Mounting: Recessed in proscenium
 2. Permanently attach screen fabric to roller.
 3. Motor Option: Silent motor
 4. Closure doors: none
 5. Viewing surface: HD Progressive 1.1
 - a. Gain: 1.1
 - b. Viewing Half Angle: 85 degrees
 - c. Size: per Drawings
 - d. Provide with black masking bottom and sides: 3 inches
 - e. Black drop: per drawings

C. Control

1. Provide with low-voltage control option
 - a. Coordinate room control system interface with Audiovisual Systems Contractor.
2. Up/down/stop control switch.

2.2 LARGE MOTORIZED FRONT PROJECTION SCREEN, NON-TENSIONED

A. Acceptable Manufacturers

1. Da-Lite, Inc.
2. Stewart Filmscreen
3. Or Equal

B. Screen

1. Type: Electrically operated, retractable, projection screen for surface mounting.
 - a. Basis of Design: Professional Electrol
 1. Installation method: Surface mounted
 2. Mounting: Wall Bracket/suspended
 3. Permanently attach screen fabric to roller.
 4. Closure doors: none
 5. Tensioned: No
 6. Enclosure: Plywood, primed for painting
 7. Viewing surface: Matte White
 - a. Gain: 1.0
 - b. Viewing Half Angle: 60 degrees
 - c. Size: per Drawings
 - d. Provide with black masking bottom and sides
 - e. Black drop: per Drawings

C. Control

1. Provide with low-voltage control option
2. Keyed up/down/stop control switch.

2.3 MOTORIZED FRONT PROJECTION SCREEN, NON-TENSIONED

A. Acceptable Manufacturers

1. Da-Lite, Inc.
2. Stewart Filmscreen
3. Or Equal

B. Screen

1. Type: Electrically operated, retractable, projection screen for recessed ceiling mounting.
 - a. Basis of Design: Advantage Electrol
 1. Installation method: Ceiling recessed
 2. Mounting: Suspended
 3. Permanently attach screen fabric to roller.
 4. Closure doors: none
 5. Tensioned: No
 6. Enclosure: White aluminum

7. Viewing surface: Matte White
 - a. Gain: 1.0
 - b. Viewing Half Angle: 60 degrees
 - c. Size: per Drawings
 - d. Provide with black masking bottom and sides
 - e. Black drop: per Drawings
- C. Control
 1. Provide with low-voltage control option
 - a. Coordinate room control system interface with Audiovisual Systems Contractor.
 2. Up/down/stop control switch.

PART 3 - EXECUTION

3.0 COORDINATION

- . Coordinate provision of electric screens with locations of other wall and ceiling mounted components such as visual display boards, casework, structural framing, light fixtures, air diffusers, ducts, and fire sprinklers to eliminate potential conflicts.
- A. Coordinate requirements for blocking and auxiliary structural supports to ensure adequate means for installation of screens.
- B. Coordinate requirements for power supply, conduit, and wiring required for electric screen and controls.
- C. Prior to installation, verify type and location of power supply.

3.1 INSTALLATION

- A. Install screens in accordance with approved shop drawings and manufacturer's installation instructions.
- B. Install projection screens at locations and heights indicated on Drawings. Verify locations in field with Architect.
- C. Install screens securely to supporting substrate so that screens are level and back of case is plumb.
- D. Adjust screen to be perpendicular to centerline of video projector beam.
- E. Set limit switches to position screen as shown on the Drawings.

3.2 TESTING AND PROTECTING

- A. Operate each screen three times minimum. Ensure screens properly extend and retract and that screen is level and viewing surface plumb when extended. Verify controls, limit switches, and other operating components are functional. Adjust to correct deficiencies.
- B. Projection surfaces shall be free from wrinkles.
- C. Protect projection screens from damage during subsequent construction activities. Remove and replace damaged screens.

End of Section

Section 11 31 00
APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide appliances, including the following:
1. Refrigerators (REF).
 2. Undercounter refrigerators (UCR).
 3. Front loading automatic washer (W) and dryer (D).
 4. Electric cooktops (ECT).
 5. Electric ranges (ER).
 6. Microwave oven combination wall oven (WO).
 7. Microwave oven, over the range (MR).
 8. Microwave oven, countertop (M).
 9. Dishwashers (DW).
 10. Accessible Dishwashers (DW/ADA).
 11. Stacked washer/dryer (W/D).
 12. Freezers (F).
 13. Range hoods (RH).
 14. Ice makers at Science classrooms and elsewhere as scheduled.
 15. Full-height refrigerators at Science classrooms and elsewhere as scheduled.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design*

and Construction, LEED BD+C: Schools rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 40 00 – ARCHITECTURAL WOODWORK: Custom millwork to be coordinated with appliance locations.
- F. Section 12 30 00 – CASEWORK: Manufactured casework to be coordinated with appliance locations.
- G. Section 12 35 53 – LABORATORY CASEWORK: Manufactured laboratory casework to be coordinated with appliance locations.
- H. Division 22 – PLUMBING: Plumbing supply to appliances.
- I. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Ventilating appliances.
- J. Division 26 - ELECTRICAL: Electrical supply to appliances.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets and specifications, for each product installed and furnished hereunder clearly indicating configurations, sizes, materials, finishes, locations, utility connections and locations. Include information on accessories and options.
 - 2. Manufacturer's installation instructions: Indicate special procedures, perimeter conditions and conditions requiring special attention.
 - 3. Manufacturer's certificates: Certify that Products provided under this Section meet or exceed UL and specified requirements.
 - 4. Manufacturer's sample warranties.
 - 5. Shop drawings for coordination: Provide dimensioned locations for utility connections.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
 - 1. Manufacturer's warranties: Include coverage of installed equipment.
 - 2. Maintenance Data: Include lubrication and periodic maintenance requirement schedules.

1.4 REGULATORY REQUIREMENTS

- A. Products requiring electrical connections: Listed and classified by UL, as suitable for the purpose specified and indicated.
- B. Provide and install the work of this Section in conformance with all applicable federal, state and municipal codes, laws and regulations regarding utilities, health, fire protection and safety.

1.5 QUALITY ASSURANCE

- A. Certification labels: Provide residential equipment which complies with standards and bears certification labels as follows:
 - 1. Energy ratings: Provide energy guide labels with energy cost analysis (annual operating costs) and energy information as required by Federal Trade Commission indicate Energy Star Rating as applicable to all appliances.
 - 2. UL standards: Provide equipment with UL labels.
 - 3. Commercial laundry equipment shall comply with Consortium for Energy Efficiency (CEE) Tier 3A.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store all materials in original packaging in protected interior location.
- B. Coordinate schedule of construction, size of access and route to place of installation to prevent delay of installation due to physical impediments. Any work involving the demolition and reconstruction of partitions, walls, floors, roofing, windows or doors to place and install the work of this Section shall be performed at not additional cost to the Owner.

1.7 WARRANTIES

- A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. General Electric Company, (GE) Appliances Division, Louisville, KY.,
 - 2. KitchenAid Company (division of Whirlpool Corp), St. Joseph, MI.
 - 3. Maytag Company, Magic Chef Division, Cleveland, TN.
 - 4. Frigidaire Corp./ Division of Electrolux Home Products Inc., Martinez, GA.
 - 5. Scotsman, Vernon Hills, IL.
 - 6. Summit, 770 Garrison Ave • Bronx, NY 10474
 - 7. Felix Storch, Inc., Summit Appliance Division, Bronx, NY.
 - 8. Whirlpool Corporation, Benton Harbor, MI.
 - 9. Continental Refrigerator Bensalem, PA.

2.2 EQUIPMENT

- A. General: Without intent to limit competition, but to establish a standard of quality, design and function desired, Drawings and specifications have been based on the models listed below. Equal products available from the manufacturers listed herein above. Under provisions of Massachusetts General Laws, Chapter 149, equal products not named herein, may be considered for acceptance as an equal by the

Architect upon submission of complete product information as described in Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES.

- B. Refrigerator: General Electric Model No. GTE21GTHWW.
- C. Refrigerator (Nurses Office B117): General Electric Model No. GIE21GTHWW.
- D. Refrigerator undercounter: General Electric Model No. GCE06GGH.
- E. Front loading automatic washer: Whirlpool Model No. CHW9160GW.
- F. Front loading automatic electric dryer: Whirlpool Model No. CED9160GW.
- G. Electric cooktop: General Electric Model No. JP3536TJWW.
- H. Electric range: General Electric Model No. JB750DJWW.
- I. Microwave oven combination wall oven: General Electric Model No. PT7800DHWW.
- J. Microwave oven (over range): General Electric Model No. PVM9179DKWW.
- K. Dishwashers: General Electric Model No. PDT8255GJWW.
- L. ADA compliant dishwasher: General Electric Model No. GLDT690JWW.
- M. Stacked washer/dryer: Maytag Model No. MLE22PRAYW.
- N. Freezer (Food Pantry): Summit Model No. SCFM82.
- O. Freezer (Chemical Storage): Summit Model No. VLT650.
- P. Microwave (countertop): General electric Model No. PEB9159DJWW.
- Q. Range Hood (recirculating): General Electric Model No. JVX5360DJWW.
- R. Provide rough-in hardware, supports and connections, attachment devices, closure trim, and accessories.
- S. Ice Maker at Science classrooms:
 - 1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Hoshizaki America, Inc." Self-Contained Flaker Model No. F-330BAJ-C.
 - 2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Hoshizaki America, Inc., Peachtree City, GA.
 - b. Scotsman, Vernon Hills IL.
 - c. U-Line Corporation, Milwaukee, WI.
 - 3. Description: Stainless steel construction inside and out with front breathing capability of undercounter mounting.
 - 4. Features: Daily ice production, 288 pounds; minimum built-in storage, 80 pounds; two second flush cycle per hour, removeable air filters; UL certified.

5. Warranty: Three year parts and labor on the entire ice machine.

T. Refrigerator at Science classrooms:

1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on General Electric Model No. GIE21GSHSS.
2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. General Electric Company, (GE) Appliances Division, Louisville KY.,
 - b. Frigidaire Corp./ Division of Electrolux Home Products Inc., Martinez, GA.
 - c. KitchenAid Company (division of Whirlpool Corp), St. Joseph, MI.
 - d. LG Electronics Corporation, Englewood Cliffs, NJ.
 - e. Maytag Company, Magic Chef Division, Cleveland TN.
 - f. Whirlpool Corporation, Benton Harbor MI.
3. Description: Energy Star certified, 21.2 cubic foot capacity, stainless steel door and body with reversible hinges.
4. Features: Top freezer, upfront temperature controls, two adjustable humidity drawers, one snack drawer, gallon storage dairy compartment, two full width freezer door bins, leveling legs.

2.3 FINISHES

- A. Finish Colors: Provide manufacturer's standard white color as approved by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify the Contractor, and copy to Architect, in writing of any conditions detrimental to the proper and timely completion of the work, and do not proceed with the work until said conditions are corrected.
- B. Verify clearances required for equipment.
- C. Verify ventilation outlets, service connections, and supports are correct and in required location.
- D. Verify that electric power is available and of the correct characteristics.
- E. Beginning of installation means acceptance of existing site conditions.

3.2 INSTALLATION

- A. Install each product in accordance with manufacturers' instructions.
1. Maximum variation for installed equipment, from true position of 1/16 inch in 8 feet for plumb and level and a maximum of 1/32 inch offsets in adjoining surfaces intended to be flush.

- B. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.
- C. Anchor equipment using devices appropriate for equipment, substrate and expected usage.

3.3 ADJUSTING

- A. Adjust work under provisions of Section 01 73 00 - EXECUTION.
- B. Adjust equipment to ensure proper working order and conditions.
- C. Remove and replace equipment creating excessive noise, or vibration.
- D. After installation is completed, insure that operating parts work freely and fit neatly. Adjust hardware and catches. Repair or replace damaged parts dents, buckles, abrasions, scraps or other damage affecting the appearance or serviceability.

3.4 CLEANING

- A. Clean Work under provisions of Section 01 73 00 - EXECUTION:
 - 1. Wash and clean appliances.
 - 2. Clean and polish glass, plastic, hardware and accessories, fixtures and fittings.
- B. Remove protective coverings from prefinished work just prior to Owner's acceptance of facility.

End of Section

SECTION 11 40 00
FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

1.01 PROVISIONS

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Work Included: Food Service Equipment, including but not limited to, the following:
1. Equipment as shown on Foodservice Drawings and Itemized Specifications, Specifications indicate minimum acceptable products.
 2. Uncrating, assembling, rigging setting, leveling, and properly and securely fastening to wall or floor as required with all necessary items such as braces, filler pieces and related items.
 3. Furnish, erect and maintain staging and scaffolding, including mechanical hoisting equipment, required for the performance of the Food Service Equipment Subcontractor's work.
 4. Plumbing, electrical, steam, and general accessories for items specified in this section, including, but not limited to faucets, strainers, lever-wastes, tail pieces, control valves, cords and plugs, and disconnects provided as standard with the equipment. Furnish to the proper mechanical or electrical trades for the final connection of utility services. Tag each item with the equipment number for easy reference.
- B. Related Work Specified in other sections, KEC is not responsible for providing or installing:
1. Plumbing Work:
 - a. Hose bibs
 - b. Final gas and plumbing connections
 - c. Water pressure regulators
 - d. Traps, tail pieces, valves, stops and shutoff valves
 - e. Grease traps
 - f. Backflow prevention
 - g. Floor sinks
 - h. Pressure Reducing Valves
 2. Heating, Ventilating and Air Conditioning:
 - a. Final duct connections
 - b. Exhaust and supply fans
 - c. Ductwork
 - d. Fan switches
 3. Electrical Work:
 - a. Final electrical connections
 - b. Disconnect switches

- c. Receptacles
- d. Ballasts
- e. Control Wiring
- f. Internal wiring to a control panel or switch

4. Wall Blocking Section 061000

1.03 SUBMITTALS

- A. Shop Drawings: Prepare separate plans for layout, electrical, plumbing and building conditions/HVAC plans at a scale of 1/4 inch to the foot showing dimension location, size, height above finished floor and, where necessary, capacity of mechanical services required for each item of equipment. Foodservice Contract Documents shall not be reproduced and represented as submittal documents.
- B. Equipment: Prepare detailed drawings at a minimum scale of 3/4 inch to the foot, plus necessary cross sections at a scale of 3/4 inch to the foot, showing complete details of each item of custom manufacture. Include accurately dimensioned layouts and locations for floor depressions if required or called for in these specifications. Include accurately dimensioned details and locations of special wall openings where items of equipment extend through walls.
- C. Product Data: Submit brochures containing illustrations, specifications, accessories, line drawings and rough-in information on brand name items (items not of custom manufacture).
- D. O & M Manuals: Submit operation and maintenance manuals containing installation, operating, maintenance and warranty information on brand name items (items not of custom manufacture).
- E. LEED Submittals: Demonstrate compliance with the following criteria, in compliance with Specification Section 018113 – Sustainable Design Requirements:
 - 1. EA Prerequisite 3 and Credit EA 4: Manufacturer's product data for refrigeration systems, including printed manufacturers' statements indicating that not CFC-based refrigerants are used.
 - 2. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives) to provide both CDPH Standard Method v1.1-2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 - June 3, 2011 or CARB 2007 SCM (paints and coatings) AND/OR SCAQMD Rule 1168 - July 1, 2005 (adhesives and sealants). Products Tested/Certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold; MAS Certified Green.
 - 3. All applicable food service equipment to comply with the WEp2/c2 Indoor Water Use Reduction prescriptive requirements outlined on pages 270 - 271 and 302 - 303 of the LEEDv4 BD+C reference guide, respectively.

1.04 QUALITY ASSURANCE

- A. Qualification of Fabricators
 - 1. To fabricate equipment such as tables, sinks, and counter tops, described in these specifications other than by name and catalog numbers, employ an equipment fabricator

who has the plant, personnel and engineering facilities to properly design and manufacture high quality equipment. The fabricator shall be subject to the approval of Architect, Owner and Colburn and Guyette. Work in the above category shall be manufactured by one manufacturer of standard unit assembly and uniform design and finish.

2. The Food Service Equipment Subcontractor for the equipment as specified in this section shall be a recognized distributor for these items of equipment which are of other manufacture than his own.
 3. Equipment to be supplied under this section of the specifications will not be acceptable unless the Food Service Equipment Subcontractor furnishes evidence that equipment of approximately the same type and design has been installed elsewhere and has been operating successfully for at least 5 years. Equipment installed for test or prototype will not be considered acceptable.
- B. Fabricate and install equipment to meet Local, State and National Board of Health regulations. Perform work and provide materials in full accordance with latest rules of U.S. Public Health Services, National Board of Fire Underwriters, and local or State Ordinances, regulations of State Fire Marshall and Underwriters Laboratory.
- C. Reference Standards:
1. NSF Standards: Comply with applicable National Sanitation Foundation standards and recommended criteria. Provide each principal item of food service equipment with a "Seal of Approval" by NSF.
 2. UL Labels: Where available, provide UL Labels on items of food service equipment with prime electrical components. Provide UL "recognized marking" on other items with electrical components, signifying listing by UL, where available.
 3. ANSI Standards: Comply with applicable ANSI standards for gas-burning appliances, for piping to compressed gas cylinders, and for vacuum breakers and air gaps to prevent siphonage in water piping (ANSI 221) series, B57. 1, A40.6 and A40.4).
 4. NFPA Codes: Comply with "National Electrical Code", and BOCA with NFPA No. 96 for exhaust system equipment, NFPA No. 17 & 17A for wet chemical extinguishing system equipment; and NFPA No. 54.
- 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING
- A. Properly package and protect equipment during shipping, handling, and storing to prevent damage.
 - B. Store indoors or under cover, on raised platforms, fully protected from dirt and moisture.
 - C. Measures must be taken to protect equipment after installation and before final turnover.
- 1.06 EXISTING CONDITIONS
- A. Field Measurements: Check measurements at building and be responsible for making the food service equipment fit.

1. Examine the drawings and identify critical areas which might affect the fitting of equipment, aisles, installation, or other functional aspects of the equipment. Submit drawings which show structural measurements and dimensions which are critical to the proper execution and fitting of work.

1.07 WARRANTIES

- A. New equipment specified for this facility shall be guaranteed for a period of one (1) year beginning on the date of the final acceptance of this section. Manufacturers shall provide their standard guarantees and warranties for work under this section. However, such guarantees and warranties shall be in addition to and not in lieu of the above stated one (1) year warranty as well as other liabilities which the Manufacturer and the Food Service Equipment Subcontractor may have by law or by other provisions of the Contract Documents.

1.08 EXISTING EQUIPMENT

- A. Verify and document condition of equipment to be reused.
- B. Confirm status of removed equipment with owner prior to any action taken.
- C. All existing equipment to be re-used to be relocated and set in place by KEC and all MEP disconnect and reconnection by appropriate trades.
- D. General Contractor responsible for any on site storage of existing equipment to be reused.
- E. Remove and dispose of all existing equipment to be replaced.
- F. Coordinate disconnect, capping and making safe of equipment utilities by General Contractor. Coordinate reconnect of all existing equipment with appropriate trades.
- G. Coordinate all new equipment locations in the field with General Contractor to ensure proper placement as per equipment layout on Contract Documents.
- H. Verify and coordinate all details, dimensions and utility requirements for all existing equipment to be re-used in the field with the General Contractor.
- I. Provide General Cleaning of existing equipment to be reused.

1.09 SUBSTITUTIONS

- A. All items identified in this section shall be provided as specified. Substitutions will be considered only if the following conditions have been satisfied, otherwise requests for substitutions shall be returned without action except to record noncompliance with the Contract Documents:
 1. The Foodservice Drawings and Specifications have been designed and engineered based on the primary specification. Any and all coordination and cost associated with the incorporation of a substituted piece of equipment will be entirely the responsibility of the KEC. Including but not limited to engineering changes due to utility discrepancies, instructions to G.C. and/ or subcontractors, providing proper clearances to adjacent structures, proper fit, conduit trenching and overhead utilities and any and all modifications to building or architectural elements.
 2. All substitutions must be clearly listed in the bid proposal and shall include:
 - a. Manufacturer/ model number

- b. Utility data
- c. Accessories
- d. A list of deviations from primary spec
- e. Shop drawings for exhaust hoods, walk-ins, accumulators/ conveyors, millwork, UDS systems, variable demand vent systems and any other items deemed worthy of extra attention/ coordination. Simply submitting cutsheets will not be accepted.

An item with a listed manufacturer or "or equal" designation does not indicate that there is in fact a true equal. It is the responsibility of the KEC to assure that all alternates meet the original design intent and criteria of the primary spec.

Primary manufacturer and model must be specified unless otherwise noted in Division 1 of the bidding instruction if Energy Star and Massachusetts State Plumbing Board Approved.

3. Revisions to Contract Documents are not required.
4. Proposed substitutions are in keeping with the general intent of Contract Documents.
5. The suggested substitutions is directly related to an "or equal" clause or similar language in the Contract Documents or as requested by the Owner/ Architect. Otherwise, provide as specified.
6. Proposed substitutions shall be equal in quality, durability, appearance, strength, design and approvals. If it is determined at any time by the owner or owner's rep prior to final acceptance that the substitution is not equal to primary spec, the KEC shall assume responsibility and all associated costs required to replace with the correct model.
7. Proposed substitutions shall perform equally the function imposed by the general design.
8. Proposed substitutions conform substantially, even with deviations, to the detailed requirements for the product identified in these specifications. Including, but not limited to, voltage, amperage, phase, MBTU, cold water connections, hot water connections, waste drains and exhaust/ supply CFM requirements, collar sizes and static pressure.
9. A substantial advantage is afforded the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Said advantages and responsibilities shall be fully outlined in the above noted submission requirements. Additional requirements to the Owner may include additional compensation to the Architect and Food Service Consultant for redesign and evaluation services, increased costs of other construction by the Owner or separate contractors, and similar considerations.
10. Proposed substitutions must meet all approvals and certifications of the originally specified equipment, including but not limited to, Energy Star and Massachusetts State Plumbing Board Approval. Appropriate documentation is required to be submitted with the proposed substitutions.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Provide manufacturer's standard equipment except as otherwise noted in the Itemized Specification.

2.02 MATERIALS

- A. Stainless steel (s/s): Non-corrodible alloy, or stainless steel, specified hereinafter type 304/305 stainless steel, having a standard analysis of 18 percent chrome and 8 percent nickel. (AISI type 304/305, hardest workable temper, No. 4 directional polish).
- B. Galvanized steel sheet (GLV): Eight (8) coat galvanized copper bearing, used in largest possible sheets with as few joints as necessary. Painted hammer stone gray enamel unless otherwise specified. (ASTM A 526 except ASTM A 527 for extensive forming: ASTM A 525, G90 zinc coating chemical treatment.)
- C. Steel sheet: ASTM A 569 hot-rolled or cold formed, carbon steel unless stainless steel is indicated.
- D. Steel structural members: Hot-rolled or cold formed, carbon steel unless stainless steel is indicated.
- E. Galvanized finish: ASTM 123 hot-dipped zinc coating.
- F. Aluminum: ASTM B209/B221 sheet, plate, and extrusion (as indicated): Alloy, tempered finish as determined by manufacturer/fabricator, except 0.40 mil natural anodized finish on exposed work unless another finish is indicated.
- G. Sealants: One-part or two-part, polyurethane or silicon based liquid elastomeric sealant, non solvent release type, mildew resistant. Low VOC sealants shall be used on all LEED projects.
- H. Gaskets: Solid or hollow (but not cellular) neoprene or polyvinyl chloride: light gray, self-adhesive or prepared for either adhesive application or mechanical anchorage.
- I. Paints and Coatings:
 - 1. Provide the types of painting and coating materials which after drying or curing are durable, non toxic, non dusting, non flaking and mildew resistant.
 - 2. Primer coating for metal: Type suitable for baking where indicated.
 - 3. Enamel for metal: Synthetic type suitable for baking where indicated.
 - 4. Sound deadening: Heavy-bodied resinous coating, filled with granulated cork or other resilient material, compounded for permanent, non flaking adhesion to metal in a 1/8 inch thick coating.

2.03 FABRICATION OF METALWORK

- A. Gauges, where specified, shall be United States standard gauges. Finish exposed surfaces to #4 or 180 grit. Where manufacturing process and welding disturb original finish, carefully re-grind, polish, and restore to match balance of surface.
- B. General Fabrication Requirements: Remove burrs from sheared edges of metalwork, ease the corners, and smooth to eliminate cutting hazard. Bend sheets of metal at not less than the minimum radius required to avoid grain separation in the metal. Maintain flat, smooth surfaces without damage to finish.

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- C. Reinforce metal at locations of hardware, anchorages and accessory attachments, wherever metal is less than fourteen (14) gauge or requires mortised application. Conceal reinforcements to the greatest extent possible. Weld in place on concealed faces.
- D. Where fasteners are permitted, provide Phillips head flat or oval head machine screws.
- E. Work-surface fabrication: Fabricate metal work surfaces by forming and providing seamless construction, using welding rod matching sheet metal. Where necessary for disassembly, provide waterproof gasket draw-type joints with concealed bolting.
- F. Reinforce work surfaces 30 inches o.c. both ways with galvanized or stainless concealed structural members. Reinforce edges which are not self-reinforced by formed edges.
- G. Sound deaden underside of metal work surfaces, including sinks and similar units, with a coating of sound deadening material. Hold coating back 3 inches from sanitary edges which are open for cleaning.
- H. Structural framing: Except as otherwise indicated, provide framing of minimum 1 inch pipe size round pipe or tube members, with mitered and welded joints and gusset plates ground smooth. Provide 14 gauge stainless steel tube for exposed framing and galvanized steel pipe for concealed framing.
- I. Enclosure General: Provide enclosures, including panels housing, and skirt for service lines and mechanical/electrical devices and secondary enclosures for equipment items where indicated and where required for compliance with governing regulations and NSF standards. Otherwise, fabricate each item to be as open as possible for ease of cleaning. Where equipment is exposed to view, provide enclosure of service lines operating components and mechanical and electrical devices.
- J. Welding:
1. Stainless Steel Welds: Use stainless steel electrodes. Finish welds free of pits, flaws, discoloration, and peen to remove flux and impurities. Grind welds smooth, polish to original finish of metal, with grain uniform to grain of original sheet. Where grinding and/or polishing has destroyed grain, restore blend to omit traces of welding.
 2. Solder containing lead as an intentional ingredient shall not be used in a food zone or splash zone (NSF 4.2/ ANSI 2-2010).
 3. Grind concealed or exposed welds on unpolished surfaces back to original surface metal to remove impurities from welds. Make welds smooth, with neither dip nor bulge.
- K. Electrical Components:
1. Fit fabricated items requiring dry heat with tube heaters of sufficient wattage to provide desired heat. Unless otherwise specified, install heaters directly below bottom shelf, mounted in suitable channels and interconnect with fire resistive covered nickel wire in accordance with State Electrical Codes. Furnish each fixture with one (1) or more thermostatic control, with pilot light indicator.
 2. Wiring shall be properly protected in metal enclosures as called for by State Electrical Code and Underwriters Laboratory
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3. Exposed electrical outlet boxes on fabricated equipment shall be stainless steel and shall be supplied and mounted by the Food Service Equipment Subcontractor ready for wiring by Electrical Subcontractor.
 4. Internal wiring for fabricated equipment items, including electrical devices built into or forming an integral part of these items shall be furnished and installed by the Food Service Equipment Subcontractor in his factory with items wired complete to a junction box within the fixture ready for final connection to building lines by Electrical Subcontractor. Receptacles shall be grounding type listed by Underwriters Laboratories and approved for use by the National Electrical Code. Each single item of fabrication shall be wired to the minimum number of junction boxes possible for that piece of equipment.
 5. Unless otherwise specified, furnish cord-connected items with cord sets not exceeding 6 feet in length. Cord sets shall contain an equipment grounding conductor and shall be furnished with caps or plugs listed or recognized by Underwriters Laboratories, Inc. Cords shall be listed by Underwriters Laboratories, Inc.
- L. Pipestands and Frames:
1. Construct pipestands for open base tables or dish tables of 1-5/8 inch 16 gauge stainless steel. Construct stringers and cross braces of same material. Weld joints between legs and cross braces and grind to a smooth finish.
 2. Cross rails supplied to reinforce each leg. Legs anchored to closed gussets at top only and without cross rails are not acceptable except in case of sinks. Fit uprights at top with die-stamped fully enclosed gussets stud-bolted to underside of top with cadmium-plated lock nuts. Where stainless steel base is called for, stainless steel gussets will be used.
- M. Feet:
1. Fit pipe legs with sanitary die- stamped stainless steel bullet shaped feet, fully enclosed with slightly rounded bottom to protect floor. These shall have a total adjustment of 1 inch with thread unexposed.
 2. Mount cabinet type fixtures on 6 inch die-stamped sanitary one-piece stainless steel feet, capable of an adjustment of 1 inch with thread unexposed.
- N. Table Tops (metal):
1. Metal table tops shall be of 14 gauge stainless steel. Shop seams and corners shall be welded, ground smooth and polished. Brace tops with 1 inch by 1 inch by 4 inch galvanized channel running length of table. Cross angles shall be furnished at intermediate legs. Bracing shall be stud bolted to underside of top with cadmium plated lock nuts. Sound deadening mastic shall break metal-to-metal contact between angle bracing and underside of top.
 2. Provide field joints in top where necessary. Locate field joints for practical construction and consistent in size, convenient for shipping and accessibility into building.
 3. Metal top edges shall be turned down 1-3/4 inch in a bullnosed roll except where otherwise called for in Itemized Specifications and/or Fabrication Drawings/Details.

O. Dish Table Tops:

1. Construct tops of dish tables from 14 gauge stainless steel with free edges turned up 3 inches and finished with die-formed sanitary rolled rim. Sides adjacent to walls or higher fixtures flanged up 10 inches and back 1-1/2 inches at 45 degree angle and vertically down one inch, except where otherwise called for in Itemized Specification and/or Fabrication Drawings/Details. Interior horizontal and vertical corners shall be covered on 5/8 inch radius. Outside radius of rolled rim corners concentric with inside cove brace with 1-1/2 inch by 1-1/2 inch by 1/8 inch stainless steel angle front-to-back on approximately 24 inch centers. Bracing shall be stud-bolted to underside of top with cadmium plated lock nuts. Sound deadening mastic shall break metal-to metal contact between angle bracing and underside of top.
2. Mount dish table tops on tubing legs and connecting rails.
3. Provide full-length splashes with closed ends.

P. Cabinet Bases:

1. Enclosed bases or cabinet bodies shall be of 18 gauge stainless steel or as called for in Itemized Specifications. Body shall be enclosed on front and ends, with body corners square. Ends shall terminate at operators side in a 2 inch wide vertical mullion. Mullion shall be in accordance with NSF requirements. Body shall be braced at top with 1-1/2 inch by 1-1/2 inch by 1/8 inch stainless steel angle frame work with angles spaced on approximately 24 inch centers. Body shall be mounted on 6 inch high stainless steel bullet counter legs, welded to 12 gauge gussets, which in turn shall be welded to the body.
2. In the case of fixtures fitting against or between the walls, the bodies shall be set in 1 inch from the wall line, but tops will extend back to wall line. This will permit adjustment to wall irregularities. A vertical trim strip of the same material as body shall be provided and installed at ends or rear of fixture to close gap between body and wall.

Q. Elevated Cabinets: Top shall be constructed of 20 gauge material or as called for in Itemized Specifications with edges turned down 1-1/2 inches from rear to front. Twenty (20) gauge body shall be enclosed on back and ends with bottom and intermediate shelves. Ends shall terminate at front in a 2 inch mullion. Mullion shall be open in accordance with NSF. Intermediate stationary shelf shall be welded to body. Back shall be fitted with channels for supporting cabinet to wall. Shelves shall be 18 gauge stainless steel.

R. Sliding Doors: Doors shall be double wall constructed with exterior and interior of 18 gauge stainless steel, fitted at top with steel ball bearing roller, operating in die-formed overhead track of same material as door exterior. Guide pins shall be located on bottom shelf at center of opening. Doors shall be fitted with die stamped, stainless steel recessed handles and a stainless steel channel for guiding door at bottom.

S. Hinged Doors: Doors shall be double pan-shaped with exterior and interior of 18 gauge stainless steel. Hinged doors, flush type, shall be mounted on concealed stainless steel slip joint hinges. Doors shall have integral, flush handles and shall be fitted with magnetic catches.

T. Drawers: Drawer bodies shall be die-stamped pans, sizes and material as called for in Itemized Specifications and/or Fabrication Drawings/Details with horizontal and vertical corners generously coved. Drawer bodies or pans shall rest in and shall be removable from cradle. Cradle shall be welded to die-stamped drawer face of 16 gauge stainless steel. Drawer face shall be furnished with die-stamped integral handle. Cradle shall be furnished with ball bearing

- steel rollers and stops. Drawer housing shall be complete with ball bearing steel rollers and built-in self-closing track to accommodate rollers on cradle.
- U. Undershelves for Open Bases: Undershelves on open base tables shall be solid, of 16 gauge stainless steel.
- V. Interior Shelves for Cabinet Bases: Interior shelves in cabinet bodies and enclosed bases shall be solid, of 16 gauge stainless steel with set-back construction. Provide non-removable shelves with ends and backs turned up 1-1/2 inches against body of fixture, and welded to same. Front edge shall be further braced with longitudinal centered 1-1/2 inch by 1-1/2 inch by 1/8 inch angles.
- W. Pipe Chases:
1. Where top arrangement of enclosed base table make it necessary for plumbing and supply piping to be passed through base, this piping shall be enclosed in suitable pipe chase with easily removable access panels. These access panels are not to be held in place with screws or latches, but formed up in a pan shape, removable with out tools.
 2. In detailing fixtures, the Food Service Equipment Subcontractor shall consult with the Mechanical and Electrical Subcontractor to be certain that due allowance is made for traps or other controls and fittings.
 3. Where plumbing and supplying piping pass through shelves on open base tables, shelves neatly punched or die-stamped for piping, the Food Service Equipment Subcontractor shall note location of such pipe chases or stamped pipe openings on his plan and/or detail drawings. Unless otherwise specified, shelves in these fixtures shall be turned up a minimum of 3 inches at edge of pipe chase. These shall be of sufficient size to accommodate necessary risers, so that additional holes need not be cut. The Food Service Equipment Subcontractor shall caution the Mechanical Subcontractor to rough-in as near to these chases as possible, so risers from rough-in to final connection run through existing chases and/or slots.
- X. Elevated Shelves: Elevated shelves shall be constructed of 16 gauge stainless steel, unless otherwise called for with edges and brackets per Fabrication Details. Shelves shall be mounted on solid stainless steel gusset type wall brackets. If table mounted, supports shall be stainless steel tubing of size and gauge called for in Fabrication Details and mounted in accordance with one of the following:
1. Supports mounted to flat surface (metal), without undercounter restrictions, shall be bolted through top with 3/4 inch stainless steel bolt into steel bushings wedged into tubing or welded into flange welded to table top as called for in Fabrication Details.
 2. Supports mounted to flat surface (maple or composition) shall be surface mounted with raised ferrules and set screws.
 3. Supports mounted to rolled rim shall be contoured to match roll and mounted with raised ferrules and set screws.
 4. Supports mounted to table riser, use stainless steel saddle brackets mounted to riser or mounted through riser to angle bracket and welded to riser and bracket as called for in Fabrication Details.

Y. Sinks:

1. Sinks shall be of size called for and constructed of 14 gauge stainless steel with backs, bottoms, and front formed of one continuous sheet with ends welded in place.
2. Horizontal edges and vertical corners of sink shall be covered on 3/4 inch radius. Two and three compartment sinks shall have double wall partitions of same material as sink. Intersections between partitions and sink body shall be covered on 3/4 inch radius, all welded construction.
3. Bottom of each compartment shall have six (6) radial grooves pitched to drain depression. Sinks shall have 2 inch basket lever-wastes unless otherwise specified.
4. Front and end edges of sink shall be finished with 1-1/2 inch diameter semi-roll with rounded corners, with entire roll terminating against rear splash and fully welded and polished. Back turned up 6 inches at work table w/ sinks and 12" at pot sinks with 1-1/2 inch turn back at top and ends on 45 degree angle and vertically down 1 inch, except where otherwise called for in Itemized Specification and/or Fabrication Drawings/Details. Ends of splash shall be closed.
5. Equip drawers, cabinets, and doors with tumbler locks and keys.

Z. Casters:

1. Where called for in Itemized Specifications, provide heavy-duty, neoprene ball bearing swivel casters.
2. Unless otherwise specified, casters shall have foot-activated locking brakes.

2.04 WALK-IN REFRIGERATION

- A. Construction: Construct the box using a 4" thickness of frost foamed-in-place urethane insulation with a K factor of .13" or less between die-formed metal pans with materials as contained hereinafter. Flange edges of metal pans in on all sides and construct panels with gasketed joints. Join sections by means of cam actuated joining devices. Distance between locks not to exceed 46". Each locking device shall consist of a cam-action, hooked locking arm placed in one section, and a steel rod precisely positioned in the adjoining section so that by rotating the locking arm, the hook engages over the rod with cam-action draws the sections tightly together. Locks are actuated from inside the walk-in. Provide an aligning device in at least one joining device per vertical section. Provide entrance door flush with walls of unit. Provide door with 4" insulation same as walls, a 2'-10" x 6'-4" high clear opening, balloon type gasket on three sides, and adjustable sweep gasket on the bottom. Provide door with two cam lift positive closing polishing aluminum hinges with nylon bearings, and a polished aluminum latch assembly with cylinder lock. The inside safety release handle shall operate on no more than a quarter turn, and shall be effective for all locking methods employed by manufacturer. The Food Service Equipment Subcontractor shall provide 14 gauge stainless steel thresholds. Build heater wires into the front of door sections under the metal at the point of gasket contact. Construct the box in accordance with N.S.F. Standards, and provide the standard dial thermometer.
- B. Materials: Construct exterior surfaces of walk-in box assembly, except exposed surface of walk-in cooler and freezer, of 22 gauge galvanized steel; interior surfaces (with the exception of interior floors) of aluminum; exposed exterior surface of walk-in cooler and freezer of stucco patterned .042" aluminum; interior floor of 14 gauge galvanized steel when box is depressed

and 12 gauge mill aluminum when box is specified with an interior floor ramp; and doors of stainless steel on both sides unless otherwise specified in Itemized Specification.

- C. Accessories: Provide box with interwired vapor proof light fixtures and guards (quantity as stated in Itemized Specification) operative from an outside light switch and pilot light. The Food Service Equipment Subcontractor shall provide and install 18 gauge trim angles at the sides and a closer panel from the box to the adjacent finished ceiling at the front. The fabricated panel at top shall support finished ceiling provided by the Contractor. Provide walk-in box with a dual temperature monitoring alarm system as described herein. The Food Service Equipment Subcontractor shall provide and install 36" H, 16 gauge stainless steel diamond tread kick panel on exposed interior surface of walk-in box door. The Food Service Equipment Subcontractor shall seal kick panels to box, break all edges, and secure panels with flat head stainless steel screws.
- D. Mechanical Refrigeration:
1. Furnish and install complete refrigeration for the walk-in boxes in accordance with the plans and Itemized Specification. Include condensing unit, evaporator coils, piping and accessories specified, and as required to provide complete and satisfactory systems in accordance with accepted refrigeration practice.
 2. Refrigerant Piping: Furnish and install all of the interconnecting piping between the condensing units and their respective unit coolers. Install piping in a neat and workmanlike manner with adjustable hangers spaced at not more than 10 foot intervals on all horizontal runs, or 6 foot intervals on vertical runs. Provide line sizes in accordance with equipment manufacturer's standards and best refrigeration practice, to assure proper refrigerant feed to evaporators, avoid excessive pressure drop, prevent excessive amounts of lubricating oil from being trapped in any part of the system, protect the compressors from loss of lubrication in all times, prevent liquid refrigerant from entering the compressor during operation or idle time, and maintain a clean and dry system. All refrigeration piping to be a Type L, ACR grade, hard drawn seamless copper tubing, wrought type copper fittings with silver bearing soldered joints. In each refrigeration system, include liquid and suction cut-off valves at the evaporator, with a thermostatic expansion valve and solenoid. Furnish and install all necessary sleeves for refrigerant and evaporator condensate piping wherever piping passes through a ceiling or wall. Fabricate sleeves of a non-conductive gray plastic tubing, sized at least 1/4" larger than piping or conduit and neatly pack with brine putty after installation.
 3. Condensate Drains: Condensate drain piping from the unit coolers to open drains shall be provided by the Plumbing Subcontractor. Provide drain line heaters in the freezer compartment as part of this section.
 4. Above Freezing Areas Insulation: Cover all suction lines for refrigerated areas having a temperature above freezing with 1/2" Armaflex insulation being applied to these lines as they are being installed so that insulation will not have to be split, and in accordance with the manufacturer's recommendation.
 5. Below Freezing Areas Insulation: Cover all suction lines for refrigerated areas having a temperature below freezing with 3/4" Armaflex insulation being applied to these lines as they are being installed so that insulation will not have to be split, and in accordance with the manufacturer's recommendation.
 6. Condensate Lines: Insulate all condensate lines passing through the refrigerated areas similarly with 1/2" Armaflex insulation.

7. Temperature Controls: Control the temperature in each refrigerated area by means of a remote bulb thermostat wired to actuate a solenoid valve in the liquid line with the compressor operation controlled by the low-pressure cut-out switch. Adjust thermostats to maintain the room temperature specified.
8. Defrost Controls: Provide all refrigerated areas with a time initiated defrost cycle. Locate the defrost time clock at the condensing units. Provide contacts capable of handling electric load of electric defrost of evaporator coils.
9. Mounting and Wiring: Mount the thermostat on the wall behind the evaporator coil. The Electrical Subcontractor shall interwire between the condensing unit defrost clock, thermostat, liquid line solenoid valve and the evaporator coil. Provide adequate wiring diagrams and guidance to achieve correct operation of system.
10. Refrigerant Testing: Pressure and leak test the entire system for no less than 100 P.S.I.G., clean and dehydrate by maintaining a vacuum of 50 microns or lower for a period of five hours. The required operating charge of refrigerant and oil, if necessary, shall be added and the entire system tested for performance. Mark each system clearly as to the refrigerant type required.
11. Guarantee: Provide a mechanical guarantee on all mechanical refrigerant equipment for a period of one year after date of acceptance by the Owner, and provide an emergency service, free of charge, whenever necessary on a 24-hour, seven-day-a-week basis during the guarantee period. The installer shall provide the year's service, and under no circumstances will the service policy be sublet to another refrigerant contractor. Locate the name of the installer's service agency for the guarantee period in a prominent place on the condensing units. Repair any leaks that occur during the first year period of operation after acceptance by the Owner and cover any necessary refrigerant added during this period at no expense to the Owner. Provide the condensing units with an additional four-year warranty to commence upon the completion of the aforementioned guarantee.
12. Guarantee equipment to maintain the following temperatures:

COOLER	+35 degrees F.
FREEZER	-10 degrees F.
13. Condensing Unit: Design the condensing unit for operation with refrigerant that is in compliance with the "Montreal Protocol". Capacity, horsepower, design suction and condensing temperatures of each unit are specified in the equipment schedule contained hereinafter. Each unit shall consist of a motor, compressor, refrigerant, condenser, liquid receiver, compressor service valves and a dual high-low pressure control. Provide the compressor with motor, built-in suction gas filter, oil sight glass and mounted unit on a steel base. Compressor shall not exceed 1750 R.P.M. with a maximum piston speed of 600 R.P.M. Supply the condensing units with an air-cooled condenser constructed of copper tube and aluminum fin condensers together with a fan motor assembly, or water cooled condensing unit to be connected to chilled water loop. Refer to itemized specifications.
14. Condensing Unit Housing: Provide the unit with a factory mounted prewired control panel complete with circuit breakers and/ or fuse disconnect, and with defrost clock. Provide, in addition, a liquid line assembly consisting of a filter-drier, sight glass and shut-off valve, a factory mounted liquid line vibration eliminator and a suction line vibration eliminator. Provide the unit with the proper controls and crankcase heater for outdoor installation. Mount the units on steel legs with flanged feet and protect the unit with a weatherproof cowl constructed of galvalume with hinged compressor compartment cover, and

weatherproof electrical panel. Provide positive winter control by means of a factory mounted floated head pressure control valve. Verify location of condensing units with the Contractor. For roof mounted applications, secure to structure provided by the Contractor. Related sub-trades shall make the final electrical and drain connections and the interwiring between the terminal clocks and the evaporator coils.

15. Evaporator Coil - Walk-In Cooler: Provide evaporator for cooler box, designed for installation at the juncture of wall and ceiling. Construct unit so that air is drawn in through the finned surface and discharged parallel to the ceiling. Construct finned coil of copper tubes with aluminum fins, 6 per inch. Provide fan motor with a drip proof, continuous fan duty type, operating at no more than 100 R.P.M. Construct casing of aluminum. Construct the unit cooler hardware of stainless steel. Provide a suction-liquid heat exchanger and mount within the casing. Construct coil in accordance with N.S.F. Standards. The Electrical Subcontractor shall perform all interconnect wiring in the Cooler.
16. Evaporator Coil - Walk-In Freezer: Use the automatic electric defrost system providing application of heat in the walk-in freezer and provide one coil, with electric defrost heaters, suction-liquid heat interchanger, drainline heater cable, timer and safety heat thermostat. Provide defrost system with temperature termination to prevent excessively long defrost period. Construct coil of copper tubes and aluminum fins, 6 per inch. Enclose stainless steel sheathed electric heating elements- 3/8" O.D. within the collared fin holes. Heat the drain pan by means of stainless steel sheathed elements held in place by spring clips. Construct casing with stainless steel hardware. Provide fan motors of a drip proof, continuous fan duty type operating at not more than 1500 R.P.M. Provide installation of the electric defrost system in accordance with the manufacturer's recommendations. Construct coil in accordance with N.S.F. Standards. The Electrical Subcontractor shall perform all interconnect wiring in the freezer.
17. Furnish and install 3/8" diameter threaded nylon mounting rods with stainless steel washers and nuts, and reinforcing angle at the exterior top of the rooms for the mounting of the unit evaporators.

2.05 FIELD QUALITY CONTROL

- A. The Owner, Architect or their duly authorized representative shall have free access to Food Service Equipment Subcontractor's shop or shops during the construction of this equipment for the purpose of making inspections to see that plans, specifications, and detail drawings are being adhered to carefully. The Food Service Equipment Subcontractor shall correct errors found during these inspections to the extent and within scope of plans, specifications and detail drawings.
- B. Material delivered to site may be inspected by Owner, Architect or their authorized representative. The Food Service Equipment Subcontractor shall within a reasonable time after receiving written notice from Architect to that effect, proceed to remove from grounds or building materials, fixtures or apparatus condemned by Architect or take down and remove portions of work which Architect deems as failing to conform to drawings and specifications and to conditions of the contract.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION

- A. Rough-in-work: Require Installer of food service equipment to examine roughed-in mechanical and electrical services and installation of floors, walls, columns and ceilings, and conditions under which the work is to be installed; and to verify dimensions of services and substrates before fabricating and installing the work. Notify the Food Service Equipment Subcontractor in writing of unsatisfactory conditions for proper installation of food service equipment. Do not proceed with fabrication and installation until unsatisfactory dimensions and conditions have been corrected in a manner acceptable to the Installer.

3.02 INSTALLATION

- A. Service Lines and Equipment Connections: Comply with applicable requirements of Division-22 for piping connections and piping systems. Comply with applicable requirements of Division-26 Sections for electrical work including equipment connections.
- B. Set each item of non mobile and non portable equipment securely in place, leveled and adjusted to correct height. Anchor to supporting substrate where indicated and where required for sustained operation and use without shifting or dislocation.
- C. Conceal anchorages where possible. Adjust counter tops and other work surfaces to a level tolerance of .0625 inch maximum offset, and maximum variation from level or indicated slope of .0625 inch per foot.
- D. Complete field assembly joints in the work (joints which cannot be complete in shop) by welding, bolting and gasketing, or similar methods as indicated. Grind welds, smooth and restore finish. Set or trim gaskets flush, except for "T" gaskets as indicated.
- E. Treat enclosed spaces inaccessible after equipment installation by covering horizontal surfaces with powdered borax at a rate of four ounces per square foot.
- F. Install closure plates and strips where required, with joints coordinated with units of equipment. Make joints airtight, waterproof, vermin-proof and sanitary for cleaning purposes. In general, make sealed joints not less than .125 inch at .25 inch depth. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of materials at joint. At internal corner joints, apply sealant or gaskets to form a sealant-filled or gasket joints up to .50 inch joint width; metal closure strips for wider joints, with sealant application each side of strips. Anchor gaskets mechanically or with adhesives to prevent displacement.

3.03 CLEANING AND RESTORING FINISHES

- A. After completion of installation, and completion of other major work in food service areas, remove protective coverings, and clean food service equipment, internally and externally. Restore exposed and semi-exposed finishes to remove abrasions and other damages; polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

3.04 TESTING, START-UP AND INSTRUCTIONS

- A. General: Execute the start-up of food service equipment after service lines have been tested, balanced and adjusted for pressure, voltage and similar considerations; and after water and steam lines have been cleaned and treated for sanitation.

- B. Test each item of operational equipment to demonstrate that it is operating properly and that controls and safety devices are functioning. Repair or replace equipment which is found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.
- C. Instruct Owner's operating personnel in proper operation and maintenance procedures for each item of operational food service equipment.
- D. Final Cleaning: After testing and start-up, and before the time of substantial completion, clean and sanitize food service equipment, and leave in condition ready for use in food service.

3.05 ITEMIZED SPECIFICATION

ITEM # 1 MOBILE WALK-IN SHELVING

Quantity: Twenty-One (21)
Manufacturer: Cambro
Model: EMU244870V4580

1. Twenty-One (21) Model EMU244870V4580 Camshelving® Elements Mobile Unit, 24"W x 48"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF

ITEM # 1A MOBILE WALK-IN SHELVING

Quantity: Four (4)
Manufacturer: Cambro
Model: EMU246070V4580

1. Four (4) Model EMU246070V4580 Camshelving® Elements Mobile Unit, 24"W x 60"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF

ITEM # 1B MOBILE WALK-IN SHELVING

Quantity: Two (2)
Manufacturer: Cambro
Model: EMU243670V4580

1. Two (2) Model EMU243670V4580 Camshelving® Elements Mobile Unit, 24"W x 36"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, brushed graphite, NSF

ITEM # 1C MOBILE WALK-IN SHELIVING

Quantity: Five (5)
Manufacturer: Cambro
Model: EMU243670V4580

1. Five (5) Model EMU243670V4580 Camshelving® Elements Mobile Unit, 24"W x 36"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, brushed graphite, NSF

ITEM # 1D MOBILE WALK-IN SHELIVING

Quantity: Nine (9)
Manufacturer: Cambro
Model: EMU245470V4580

1. Nine (9) Model EMU245470V4580 Camshelving® Elements Mobile Unit, 24"W x 54"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF

ITEM # 2 WALK-IN COOLER/FREEZER

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: CUSTOM

1. Provide manufacturer's standard and the following.
2. Verify and coordinate dimensions in the field with the General Contractor or Construction Manager.
3. Provide overall height of unit to be 8'-6" including floor.
4. Provide unit with two (2) additional interwired vapor proof LED light fixture for freezer compartment and four (4) for refrigerator compartment.
5. Provide unit with white patterned aluminum finish in interior and standard patterned aluminum on exposed exterior sides, with the unexposed sides being galvanized.
6. Provide matching closure panels at sides and to ceiling. Verify ceiling height with the Architect.
7. Provide unit with two (2) stainless steel, self closing doors with Kason #1256 spring assisted hinges, hinged as shown on plan with interior/exterior diamond tread kickplates and a view window.
8. Provide unit with audio/visual temperature alarm, one for each compartment.
9. Provide heated pressure relief valve for freezer.
10. Provide unit with System 200 Monitoring System
11. All interconnect and control wiring associated with walk-in by Electrical Subcontractor.

ITEM # 3 FREEZER COIL

Quantity: One (1)

Manufacturer: American Panel Corporation
Model: LET120

1. Provide manufacturer's standard and the following.
2. Coordinate connection with Item No. 4 - Freezer Condensing Unit.
3. Coordinate defrost control wiring with Electrical Contractor.
4. Coordinate refrigeration line runs and electrical control circuits with the General Contractor. Conduit to be sealed inside and out.
5. Provide unit with drain line heat tape.

ITEM # 4 FREEZER CONDENSING UNIT

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: BHT031L6CF

1. Provide manufacturer's standard and the following.
2. Provide unit with R404A Refrigerant
3. Coordinate refrigeration line runs and electrical control circuits with Construction Manager. Conduit to be sealed airtight inside and out.
4. All coring through walls, floors and ceilings coordinated and completed by the Construction Manager.
5. Final connections for electrical control circuits by Electrical Contractor.
6. Provide unit with 24" outdoor stand.
7. Coordinate Interconnection with Item No. 3 - Freezer Coil

ITEM # 5 COOLER COIL

Quantity: Two (2)
Manufacturer: American Panel Corporation
Model: ADT130

1. Provide manufacturer's standard and the following.
2. Coordinate connection with Item No. 6 - Cooler Condensing Unit
3. Coordinate refrigeration line runs and electrical control circuits with the General Contractor. Conduit to be sealed inside and out.

ITEM # 6 COOLER CONDENSING UNIT

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: BHT030X6CFM

1. Provide manufacturer's standard and the following.
2. Provide unit with R404A Refrigerant
3. Coordinate refrigeration line runs and electrical control circuits with Construction Manager. Conduit to be sealed airtight inside and out.
4. All coring through walls, floors and ceilings coordinated and completed by the Construction Manager.
5. Final connections for electrical control circuits by Electrical Contractor.
6. Provide unit with 24" outdoor stand.

7. Coordinate Interconnection with Item No.'s 5 - Cooler Coil.

ITEM # 7 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 7A SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 7B PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 8 DISPOSER/CONTROLS

Quantity: One (1)
Manufacturer: InSinkErator
Model: SS-200-7-AS101

1. One (1) Model SS-200-7-AS101 SS-200™ Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 2 HP motor, stainless steel construction, includes syphon breaker, (2) solenoid valves, (2) flow control valves, removable splash baffle, stainless steel sink stopper, programmable AquaSaver® Control Center AS-101 with water-saving technology, automatic water saving function, auto reversing, timed run, post flush, adjustable leg kit
2. Coordinate installation with Item No. 9 - Soiled Dishtable & Pot Sink.
3. One (1) Short disposer body height, 1" shorter than standard
4. One (1) Model SYPHON 45DEG Syphon breaker upgrade, chrome, 45° fittings (replace with 13412)
5. One (1) Model DEJAMWRENCH Dejamming wrench, fits 6-5/8" opening only (Not for use with throat guard) (13993)

ITEM # 9 SOILED DISHTABLE & POT SINK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Three (3) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
3. Two (2) T&S Brass Model B-0231-CR-K-F10 Pantry Faucet, double, 8" wall mount, 12" swivel nozzle, ceramic cartridges with check valves, lever handles, (2) 24" flexible hoses, installation kit, 1.0 GPM aerator, low lead, ADA Compliant, 1/2" NPT, (B-0230-k)
4. Provide unit with one (1) 21" x 21" x 9" deep sink with stainless steel rack guides and three (3) 21" x 27" x 14" deep sinks.
5. Coordinate fabrication with regard to delivery and access into building.
6. Coordinate turn-down into Item No. 14 - Dishmachine.
7. Provide unit with disposer controls mounting bracket.

ITEM # 9A PRE-RINSE ASSEMBLY

Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0133-08C

1. One (1) Model B-0133-08C EasyInstall Pre-Rinse Unit, spring action gooseneck, 8" wall mount, JeTSpray low flow valve 1.20 gallons per minute
2. Provide unit mounted centered over 21" x 21" sink provided on Item No. 9 - Soiled Dishtable w/ Sink & Pot Sink.
3. One (1) Model B-0109-01 wall bracket, 6"
4. One (1) Model B-0230-KIT Inlet Kit, 1/2" NPT nipple, close elbows, 24" flex supply hoses

ITEM # 9B PRE-RINSE ASSEMBLY

Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0133-08C

1. One (1) Model B-0133-08C EasyInstall Pre-Rinse Unit, spring action gooseneck, 8" wall mount, JeTSpray low flow valve 1.20 gallons per minute
2. Provide unit mounted centered over 21" x 21" sink provided on Item No. 9 - Soiled Dishtable w/ Sink & Pot Sink.
3. One (1) Model B-0109-01 Wall Bracket, 6"
4. One (1) Model B-0230-KIT Inlet Kit, 1/2" NPT nipple, close elbows, 24" flex supply hoses

ITEM # 10 DISPOSER/CONTROLS

Quantity: One (1)
Manufacturer: InSinkErator
Model: SS-200-7-AS101

1. One (1) Model SS-200-7-AS101 SS-200™ Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 2 HP motor, stainless steel construction, includes syphon breaker, (2) solenoid valves, (2) flow control valves, removable splash baffle, stainless steel sink stopper, programmable AquaSaver® Control Center AS-101 with water-saving technology, automatic water saving function, auto reversing, timed run, post flush, adjustable leg kit
2. Coordinate installation with Item No. 9 - Soiled Dishtable & Pot Sink.
3. One (1) Short disposer body height, 1" shorter than standard
4. One (1) 208v/60/3-ph, 3.3 amps
5. One (1) Model SYPHON 45DEG Syphon breaker upgrade, chrome, 45° fittings (13412)
6. One (1) Model DEJAMWRENCH Dejamming wrench, fits 6-5/8" opening only (Not for use with throat guard) (13993)

ITEM # 11 SPARE NO.

ITEM # 12 SPARE NO.

ITEM # 13 EYE WASH STATION

Quantity: One (1)
Manufacturer: T&S Brass
Model: EW-7360B

1. Provide manufacturer's standard and the following.
2. PC – Provide warm water as required by ANSI Z358.1-2004.
3. Provide unit mounted according to ADA standards.

ITEM # 14 DISHMACHINE

Quantity: One (1)
Manufacturer: Champion
Model: 44 PRO

1. One (1) Model 44 PRO Pro Series, 44"W rack conveyor dishwasher, Proportional Rinse, Progressive anti-jam drive system, top mounted Prodigy series HMI user interface, Proactive maintenance software, 100 gallons per hour with energy sentinel (idle pump shut-off), (209) racks per hour, single-piece hood design, single-piece stainless steel upper & lower wash arms manifolds, internal removable scrap basket, dual-piece scrap screens, 20" standard vertical clearance which accommodate 18" x 26" sheet pans, full 180° opening leak proof insulated hinged access doors, automatic tank fill, door safety switches, leak-proof ball valve drains, lower front & side enclosure panels, stainless steel heavy gauge construction including base & legs, electric tank heat, 2 HP wash pump, single point machine & separate booster connection, vent fan control, stainless steel rear manifolds, NSF, cULus
2. Coordinate turn-down from Item No's 9 & 15 - Soiled Dishtable & Pot sink and Clean Dishtable.
3. One (1) Complimentary factory authorized performance test included, upon equipment start-up. Consult local Champion sales representative for coordination of the start-up. If customer is beyond 60 miles from Champion authorized service agent, consult factory.
4. One (1) Right-to-left operation
5. One (1) Voltage to be determined

6. One (1) Electric tank heat, standard
7. One (1) Electric booster, 70° rise, 21kW, built-in
8. One (1) Shock Arrestor (un-mounted)
9. One (1) Drain water tempering kit (un-mounted)
10. One (1) Extended stainless steel vent cowl with 7" stack & locking damper (set)
11. One (1) Higher than standard vertical clearance (consult factory for price)
12. One (1) Table limit switch, whisker style (unmounted) (traditional)

ITEM # 15 CLEAN DISHTABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate fabrication with regard to delivery and access into building.
3. Coordinate installation of table limit switch provided with Item No. 14 - Dishmachine.
4. Coordinate turn-down into Item No. 14 - Dishmachine.

ITEM # 16 WALL SHELF W/ POT HOOKS

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate fabrication with regard to delivery and access into building.
3. Provide unit mounted at 72" A.F.F.

ITEM # 17 JANITOR SHELVING

Quantity: One (1)
Manufacturer: Cambro
Model: ESU246072V4580

1. One (1) Model ESU246072V4580 Camshelving® Elements Starter Unit, 24"W x 60"L x 72"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (8) stationary traverses & (4) bags of 8 count dovetails (16 each A & B), brushed graphite, NSF

ITEM # 18 MOP SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 9-OP-20

1. One (1) Model 9-OP-20 Mop Sink, floor mounted, 25"W x 21"D x 10"H (overall), 20"W x 16" front-to-back x 6" deep (bowl size), free flow drain with 2" IPS outlet, stainless steel construction
2. Provide stainless steel backsplash up to 48" A.F.F.

3. One (1) Model K-240 Service Sink Faucet, wall mount, 8" OC, 6-1/2" spout, with hose thread & pail hook, vacuum breaker spout, wall braced, chrome-plated brass
4. One (1) Model K-03 Vacuum Breaker Repair Kit (fits Advance Tabco K-240 service faucet only)
5. One (1) Model K-242 Mop Hanger, 23", accommodates (3)
6. One (1) Model K-244 Hose & Hanger

ITEM # 19 ICE CUBER W/ BIN

Quantity: One (1)
Manufacturer: Scotsman
Model: C0630MA-32

1. One (1) Model C0630MA-32 Prodigy Plus® Ice Maker, cube style, air-cooled, self-contained condenser, production capacity up to 640 lb/24 hours at 70°/50° (474 lb AHRI certified at 90°/70°), stainless steel finish, medium cube size, 208-230v/60/1-ph, 11.0 amps, cULus, NSF, CE
2. One (1) Model B330P Ice Bin, top-hinged front-opening door, 344 lb application capacity, for top-mounted ice maker, polyethylene liner, rotocast plastic construction, includes 6" legs, NSF
3. One (1) Model AP2-P AquaPatrol™ Plus Water Filtration System, double system, designed for ice makers & beverage equipment, cubers over 650 lb & up to 1200 lb, flakers & nuggets over 1200 lb, cULus, NSF
4. One (1) Model APRC6-P AquaPatrol™ Plus Water Filter Replacement cartridges (package of 6), cULus, NSF

ITEM # 20 ELECTRIC VEGETABLE SPINNER

Quantity: One (1)
Manufacturer: Electrolux Professional
Model: 600095

1. One (1) Model 600095 (VP2) Greens Machine Vegetable Dryer, floor model, 20 gallon capacity, approximately 16 heads of chopped lettuce, adjustable on/off timer, stainless steel outer shell, stainless steel drum, includes basket (653788), casters, 1/2 HP, 115v/60/1-ph, .373kW, NEMA 5-15P, 8' cord
2. One (1) Model 653788 (BKVP2) Inner Basket, with holes

ITEM # 21 SCALE

Quantity: One (1)
Manufacturer: Doran Scales
Model: 7000XL

1. Provide manufacturer's standard.

ITEM # 22 MOBILE STAND

Quantity: One (1)
Manufacturer: Advance Tabco
Model: MT-SS-302

1. One (1) Model MT-SS-302 Equipment Stand, 24"W x 30"D x 24"H, 14/304 stainless steel top, 18 gauge stainless steel adjustable undershelf & legs, adjustable stainless steel bullet feet, NSF
2. One (1) Model TA-25ES Casters, 5" diameter, set of 4 (2 with brakes) with stainless steel for 24" tall tables & mixer stands (capacity 200 lbs per caster)

ITEM # 23 SPARE NO.

ITEM # 24 MOBILE POT SHELF

Quantity: Four (4)
Manufacturer: Cambro
Model: EMU244870V4580

1. Four (4) Model EMU244870V4580 Camshelving® Elements Mobile Unit, 24"W x 48"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF

ITEM # 25L EXHAUST HOOD

Quantity: One (1)
Manufacturer: Halton
Model: KVE

1. Provide manufacturer's standard and the following.
2. Provide construction and insulation for 0" clearance on top, sides, rear and front of exhaust hood.
3. Provide Ansul pre-pipe to extent possible.
4. Provide unit with wall mounted light and fan switches.
5. Provide unit to meet all local, state and federal codes.
6. Provide stainless steel hanger rods and brackets.
7. Provide stainless steel closure panels to ceiling on front and sides; verify ceiling height with the General Contractor.
8. Coordinate power shut-off and integration with building system by General Contractor.
9. Verify and coordinate the fabrication with regard to delivery and access into building.
10. Coordinate installation with Item No. 242 - Fire Suppression System.
11. Coordinate installation with Item No. 244 - Marvel System Control Panel.
12. Provide unit with ABD Automatic Balancing Damper.

ITEM # 25R EXHAUST HOOD

Quantity: One (1)
Manufacturer: Halton
Model: KVE

1. Provide manufacturer's standard and the following.
2. Provide construction and insulation for 0" clearance on top, sides, rear and front of exhaust hood.
3. Provide Ansul pre-pipe to extent possible.
4. Provide unit with wall mounted light and fan switches.

5. Provide unit to meet all local, state and federal codes.
6. Provide stainless steel hanger rods and brackets.
7. Provide stainless steel closure panels to ceiling on front and sides; verify ceiling height with the General Contractor.
8. Coordinate power shut-off and integration with building system by General Contractor.
9. Verify and coordinate the fabrication with regard to delivery and access into building.
10. Coordinate installation with Item No. 242 - Fire Suppression System.
11. Coordinate installation with Item No. 244 - Marvel System Control Panel.
12. Provide unit with ABD Automatic Balancing Damper.

ITEM # 26 DOUBLE ACTING MIXER

Quantity: One (1)
Manufacturer: Leland
Model: 100DA70

1. Provide manufacturer's standard.

ITEM # 27 40 GAL. TILITNG SKILLET

Quantity: One (1)
Manufacturer: Market Forge
Model: 40P-STGM

1. One (1) Model 40P-STGM Tilting Skillet, gas, 40 gallon capacity, 9.5" deep skillet pan with etched gallon markings, modular enclosed cabinet base, standard with manual tilt mechanism, spring assist cover, stainless steel pan and frame, 126,000 BTU
2. Provide unit with gas pressure regulator.
3. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
4. One (1) Spark pilot ignition system
5. One (1) 120v/60/1-ph, 3.0 amps, cord & plug, standard
6. One (1) Model 98-6012 Power Tilt
7. One (1) Model 91-5131 Steam Pan Holder Inserts, 12" x 20", pan not included, each
8. One (1) Model 98-6017 Draw Off Valve Kit, 2" tangent, with drain kit hose assembly
9. One (1) Model 98-6010 Draw-Off Strainer, 2"
10. One (1) Model 98-6003 Double Pantry Faucet, complete kit with brackets and plumbing
11. One (1) Model 98-6007 Caster Kit

ITEM # 28 HAMBURGER FORMING AND PORTIONING MACHINE

Quantity: One (1)
Manufacturer: Hollymatic
Model: R2200

1. Provide manufacturer's standard and the following.
2. Provide unit with 65lb hopper extention.

ITEM # 29 40 GAL. TILITNG SKILLET

Quantity: One (1)
Manufacturer: Market Forge
Model: 40P-STGM

1. One (1) Model 40P-STGM Tilting Skillet, gas, 40 gallon capacity, 9.5" deep skillet pan with etched gallon markings, modular enclosed cabinet base, standard with manual tilt mechanism, spring assist cover, stainless steel pan and frame, 126,000 BTU
2. Provide unit with gas pressure regulator.
3. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
4. One (1) Spark pilot ignition system
5. One (1) 120v/60/1-ph, 3.0 amps, cord & plug, standard
6. One (1) Model 98-6012 Power Tilt
7. One (1) Model 91-5131 Steam Pan Holder Inserts, 12" x 20", pan not included, each
8. One (1) Model 98-6017 Draw Off Valve Kit, 2" tangent, with drain kit hose assembly
9. One (1) Model 98-6010 Draw-Off Strainer, 2"
10. One (1) Model 98-6003 Double Pantry Faucet, complete kit with brackets and plumbing
11. One (1) Model 98-6007 Caster Kit

ITEM # 30 MOBILE WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with heavy duty, non-marking casters with brakes.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.

ITEM # 31 SPARE NO.

ITEM # 32 SPARE NO.

ITEM # 33 SPARE NO.

ITEM # 34 FLOOR TROUGH

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with anti-splash s/s grating.
3. Drain Location needs to be verified in the field w/ General contractor before fabrication of unit.

4. Provide unit located as per plans and coordinate pour path with Item No's 27, 29 & 35 - 40 Gal Tilting Skillet, 40 Gal. Tilting Skillet & 60 Gal Tilting Kettle.
5. Coordinate floor depression with the General Contractor
6. Coordinate with finished floor material to provide flush mount installation
7. Provide unit with inside dimensions of 18" x 134"

ITEM # 35 60 GALLON TILTING KETTLE

Quantity: One (1)
Manufacturer: Vulcan
Model: K60GLT

1. One (1) Model K60GLT Tilting Kettle, Gas, 60-gallon true working capacity, 2/3 jacketed, 316 series stainless steel liner with ellipsoidal bottom, manual tilt, faucet bracket on tilting console, stainless steel construction, tri-leg base, 100,000 BTU
2. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
3. One (1) Motorized Power Tilt
4. One (1) Model KTDOV PLUG2 K Series Plug Draw-off valve, 2" with perforated strainer
5. One (1) Model CLEANUP KIT Clean-up Kit, includes draw-off brush, clean-up brush with 36" handle and paddle scraper with 40" handle
6. One (1) Model SSTWHIP 48 Stainless steel whip, 48"
7. One (1) Model PADDLE 48 Paddle Scraper, 48" handle with nylon blade
8. One (1) Model SACOVER K60GLT Spring assist cover with condensate ring, field installed
9. One (1) Model STRAINR K60 Tilting kettle pouring lip strainer, 60 gallon

ITEM # 36 PREP TABLE W/ SINKS

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with stainless steel sink covers to fit in flush with countertop.
3. One (1) T&S Brass Model MPY-8WLN-12-4C EasyInstall Mini Pre-Rinse Unit, wall mount, 8" center, 12" swivel add-on nozzle, lever handle, quarter-turn compression cartridge, stream regulator tip, 24" stainless steel flex hose, 6" wall bracket, low lead, overhead spring, .65 GPM, 1/2" NPT, EPAAct2005 compliant, NSF
4. One (1) T&S Brass Model B-0220-061XCRF1 Pantry Mixing Faucet, deck mount, 8" centers, 10" swivel nozzle, ceramic cartridges with check valves, lever handles, 1.0 GPM aerator, 1/2" NPT female, low lead, ADA Compliant, (B-0425-M)
5. Two (2) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
6. Provide two (2) 20" x 20" x 12" deep sinks.

ITEM # 37 ROLL-IN COMBI OVEN

Quantity: One (1)
Manufacturer: Alto-Shaam

Model: CTP20-20G

1. One (1) Model CTP20-20G Combitherm® CT PROformance™ Combi Oven/Steamer, gas, boiler-free, floor model with roll-in cart, (20) non-tilt support rails, (20) 18" x 26" full size sheet or (40) 12" x 20" full size hotel pan (1/1 GN) capacity, PROtouch control with steam/convection/combi and retherm cooking modes, programmable cool-down, SafeVent™ steam venting, removable single-point temperature probe, (3) power levels, (4) cooking modes, CombiClean PLUS™ with (5) cleaning levels, CoolTouch3™ glass window, door hinged right, high efficiency LED lighting, stainless steel construction, seismic legs, 266,000 BTU, EcoSmart®, cULus, UL EPH ANSI/NSF 4, CE, IP X5, Gastec, ENERGY STAR®
2. One (1) OptiPure Model FX11+CR FX Water Filter System, dual, (1) 20" sump, (1) 10" filter assembly, (1) CCM-20 cartridge, (1) CTO-10 cartridge, 10,000 gallon capacity chloramine reduction, 58,000 gallon capacity chlorine reduction, .5 gpm, .5 micron reduces sediment, built-in pressure gauge, inlet shut-off valve, mounting bracket, for use with steam & combi oven applications, cold water inlet, 1/2"NPT female (160-50012)
3. Three (3) OptiPure Model CCM-20 FX Replacement Cartridge, 20", for chlorine taste, odor & chloramine reduction (252-20620)
4. Three (3) OptiPure Model CTO-10 FX Replacement Cartridge, 10", drop-in, 1.5 gpm, 15,000 gallon capacity, 0.5 micron particulate, reduces chlorine, taste and odor, NSF (for use with FX-11) (252-20110) (priced per each, 6 per case)
5. Provide unit with gas pressure regulator.
6. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
7. One (1) 120v/60/1-ph
8. One (1) Model CE-36354 CombiClean® Cleaning Tabs, (90) 18 gram packets each container for CTP/CTC series
9. One (1) Model CE-24750 Combitherm® Spray Cleaning Liquid, (12) 1 quart containers per case
10. One (1) Model CE-27889 Scale Free™ deliming product, 4 lb. bottle, citrus-based, non-corrosive
11. One (1) Model 5017976 Roll-In Pan Cart, 20 shelf pan trolley, 2-9/16" vertical spacing, fits 20-20E, 20-20G, 20-20MW and QC3-100, stainless steel construction, (4) casters (2 locking)
12. One (1) NOTE: Security options not available on recessed door models

ITEM # 38 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 38A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 38B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 39 UTILITY DISTRIBUTION SYSTEM

Quantity: One (1)
Manufacturer: Halton
Model: UDS

1. Provide manufacturer's standard and the following.
2. Coordinate installation with Item No's 26, 27, 29, 35, 37, 44, 47, 48 & 53 - 2-Burner Range, 4-Burner Range w/ Oven, 40 Gal. Tilting Skillet, 60 Gal. Tilting Kettle, Roll-In Combi Oven, Roll-In Combi Oven, Roll-In Combi Oven, Roll-In Combi Oven & Roll-In Combi Oven.

ITEM # 40L EXHAUST HOOD

Quantity: One (1)
Manufacturer: Halton
Model: KVE

1. Provide manufacturer's standard and the following.
2. Provide construction and insulation for 0" clearance on top, sides, rear and front of exhaust hood.
3. Provide Ansul pre-pipe to extent possible.
4. Provide unit with wall mounted light and fan switches.
5. Provide unit to meet all local, state and federal codes.
6. Provide stainless steel hanger rods and brackets.
7. Provide stainless steel closure panels to ceiling on front and sides; verify ceiling height with the General Contractor.
8. Coordinate power shut-off and integration with building system by General Contractor.
9. Verify and coordinate the fabrication with regard to delivery and access into building.
10. Coordinate installation with Item No. 243 - Fire Suppression System.
11. Coordinate installation with Item No. 244 - Marvel System Control Panel.
12. Provide unit with ABD Automatic Balancing Damper.

ITEM # 40R EXHAUST HOOD

Quantity: One (1)
Manufacturer: Halton
Model: KVE

1. Provide manufacturer's standard and the following.

2. Provide construction and insulation for 0" clearance on top, sides, rear and front of exhaust hood.
3. Provide Ansul pre-pipe to extent possible.
4. Provide unit with wall mounted light and fan switches.
5. Provide unit to meet all local, state and federal codes.
6. Provide stainless steel hanger rods and brackets.
7. Provide stainless steel closure panels to ceiling on front and sides; verify ceiling height with the General Contractor.
8. Coordinate power shut-off and integration with building system by General Contractor.
9. Verify and coordinate the fabrication with regard to delivery and access into building.
10. Coordinate installation with Item No. 243 - Fire Suppression System.
11. Coordinate installation with Item No. 244 - Marvel System Control Panel.
12. Provide unit with ABD Automatic Balancing Damper.

ITEM # 41 SPARE NO.

ITEM # 42 SPARE NO.

ITEM # 43 SPARE NO.

ITEM # 44 ROLL-IN COMBI OVEN

Quantity: One (1)
Manufacturer: Alto-Shaam
Model: CTP20-20G

1. One (1) Model CTP20-20G Combitherm® CT PROformance™ Combi Oven/Steamer, gas, boiler-free, floor model with roll-in cart, (20) non-tilt support rails, (20) 18" x 26" full size sheet or (40) 12" x 20" full size hotel pan (1/1 GN) capacity, PROtouch control with steam/convection/combi and retherm cooking modes, programmable cool-down, SafeVent™ steam venting, removable single-point temperature probe, (3) power levels, (4) cooking modes, CombiClean PLUS™ with (5) cleaning levels, CoolTouch3™ glass window, door hinged right, high efficiency LED lighting, stainless steel construction, seismic legs, 266,000 BTU, EcoSmart®, cULus, UL EPH ANSI/NSF 4, CE, IP X5, Gastec, ENERGY STAR®
2. One (1) OptiPure Model FX11+CR FX Water Filter System, dual, (1) 20" sump, (1) 10" filter assembly, (1) CCM-20 cartridge, (1) CTO-10 cartridge, 10,000 gallon capacity chloramine reduction, 58,000 gallon capacity chlorine reduction, .5 gpm, .5 micron reduces sediment, built-in pressure gauge, inlet shut-off valve, mounting bracket, for use with steam & combi oven applications, cold water inlet, 1/2"NPT female (160-50012)
3. Three (3) OptiPure Model CCM-20 FX Replacement Cartridge, 20", for chlorine taste, odor & chloramine reduction (252-20620)
4. Three (3) OptiPure Model CTO-10 FX Replacement Cartridge, 10", drop-in, 1.5 gpm, 15,000 gallon capacity, 0.5 micron particulate, reduces chlorine, taste and odor, NSF (for use with FX-11) (252-20110) (priced per each, 6 per case)
5. Provide unit with gas pressure regulator.
6. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
7. One (1) 120v/60/1-ph

8. One (1) Model CE-36354 CombiClean® Cleaning Tabs, (90) 18 gram packets each container for CTP/CTC series
9. One (1) Model CE-24750 Combitherm® Spray Cleaning Liquid, (12) 1 quart containers per case
10. One (1) Model CE-27889 Scale Free™ deliming product, 4 lb. bottle, citrus-based, non-corrosive
11. One (1) Model 5017976 Roll-In Pan Cart, 20 shelf pan trolley, 2-9/16" vertical spacing, fits 20-20E, 20-20G, 20-20MW and QC3-100, stainless steel construction, (4) casters (2 locking)
12. One (1) NOTE: Security options not available on recessed door models

ITEM # 45 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Unit to be mounted through splash of Item No. 45 - Mobile Work Table, coordinate installation.
3. Unit to be mounted at 60" A.F.F.

ITEM # 46 MOBILE WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with heavy duty, non-marking casters with brakes.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
4. Coordinate installation with Item No. 45 - Overshelf.

ITEM # 47 ROLL-IN COMBI OVEN

Quantity: One (1)
Manufacturer: Alto-Shaam
Model: CTP20-20G

1. One (1) Model CTP20-20G Combitherm® CT PROformance™ Combi Oven/Steamer, gas, boiler-free, floor model with roll-in cart, (20) non-tilt support rails, (20) 18" x 26" full size sheet or (40) 12" x 20" full size hotel pan (1/1 GN) capacity, PROtouch control with steam/convection/combi and retherm cooking modes, programmable cool-down, SafeVent™ steam venting, removable single-point temperature probe, (3) power levels, (4) cooking modes, CombiClean PLUS™ with (5) cleaning levels, CoolTouch3™ glass window, door hinged right, high efficiency LED lighting, stainless steel construction, seismic legs, 266,000 BTU, EcoSmart®, cULus, UL EPH ANSI/NSF 4, CE, IP X5, Gastec, ENERGY STAR®
2. One (1) OptiPure Model FX11+CR FX Water Filter System, dual, (1) 20" sump, (1) 10" filter assembly, (1) CCM-20 cartridge, (1) CTO-10 cartridge, 10,000 gallon capacity chloramine reduction, 58,000 gallon capacity chlorine reduction, .5 gpm, .5 micron reduces sediment, built-in pressure gauge, inlet shut-off valve, mounting bracket, for use with steam & combi oven applications, cold water inlet, 1/2"NPT female (160-50012)
3. Three (3) OptiPure Model CCM-20 FX Replacement Cartridge, 20", for chlorine taste, odor & chloramine reduction (252-20620)

4. Three (3) OptiPure Model CTO-10 FX Replacement Cartridge, 10", drop-in, 1.5 gpm, 15,000 gallon capacity, 0.5 micron particulate, reduces chlorine, taste and odor, NSF (for use with FX-11) (252-20110) (priced per each, 6 per case)
5. Provide unit with gas pressure regulator.
6. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
7. One (1) 120v/60/1-ph
8. One (1) Model CE-36354 CombiClean® Cleaning Tabs, (90) 18 gram packets each container for CTP/CTC series
9. One (1) Model CE-24750 Combitherm® Spray Cleaning Liquid, (12) 1 quart containers per case
10. One (1) Model CE-27889 Scale Free™ deliming product, 4 lb. bottle, citrus-based, non-corrosive
11. One (1) Model 5017976 Roll-In Pan Cart, 20 shelf pan trolley, 2-9/16" vertical spacing, fits 20-20E, 20-20G, 20-20MW and QC3-100, stainless steel construction, (4) casters (2 locking)
12. One (1) NOTE: Security options not available on recessed door models

ITEM # 48 ROLL-IN COMBI OVEN

Quantity: One (1)
Manufacturer: Alto-Shaam
Model: CTP20-20G

1. One (1) Model CTP20-20G Combitherm® CT PROformance™ Combi Oven/Steamer, gas, boiler-free, floor model with roll-in cart, (20) non-tilt support rails, (20) 18" x 26" full size sheet or (40) 12" x 20" full size hotel pan (1/1 GN) capacity, PROtouch control with steam/convection/combi and retherm cooking modes, programmable cool-down, SafeVent™ steam venting, removable single-point temperature probe, (3) power levels, (4) cooking modes, CombiClean PLUS™ with (5) cleaning levels, CoolTouch3™ glass window, door hinged right, high efficiency LED lighting, stainless steel construction, seismic legs, 266,000 BTU, EcoSmart®, cULus, UL EPH ANSI/NSF 4, CE, IP X5, Gastec, ENERGY STAR®
2. One (1) OptiPure Model FX11+CR FX Water Filter System, dual, (1) 20" sump, (1) 10" filter assembly, (1) CCM-20 cartridge, (1) CTO-10 cartridge, 10,000 gallon capacity chloramine reduction, 58,000 gallon capacity chlorine reduction, .5 gpm, .5 micron reduces sediment, built-in pressure gauge, inlet shut-off valve, mounting bracket, for use with steam & combi oven applications, cold water inlet, 1/2"NPT female (160-50012)
3. Three (3) OptiPure Model CCM-20 FX Replacement Cartridge, 20", for chlorine taste, odor & chloramine reduction (252-20620)
4. Three (3) OptiPure Model CTO-10 FX Replacement Cartridge, 10", drop-in, 1.5 gpm, 15,000 gallon capacity, 0.5 micron particulate, reduces chlorine, taste and odor, NSF (for use with FX-11) (252-20110) (priced per each, 6 per case)
5. Provide unit with gas pressure regulator.
6. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
7. One (1) 120v/60/1-ph
8. One (1) Model CE-36354 CombiClean® Cleaning Tabs, (90) 18 gram packets each container for CTP/CTC series
9. One (1) Model CE-24750 Combitherm® Spray Cleaning Liquid, (12) 1 quart containers per case
10. One (1) Model CE-27889 Scale Free™ deliming product, 4 lb. bottle, citrus-based, non-corrosive
11. One (1) Model 5017976 Roll-In Pan Cart, 20 shelf pan trolley, 2-9/16" vertical spacing, fits 20-20E, 20-20G, 20-20MW and QC3-100, stainless steel construction, (4) casters (2 locking)

12. One (1) NOTE: Security options not available on recessed door models

ITEM # 49 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Unit to be mounted through splash of Item No. 49 - Mobile Work Table, coordinate installation.
3. Unit to be mounted at 60" A.F.F.

ITEM # 50 MOBILE WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with heavy duty, non-marking casters with brakes.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
4. Coordinate installation with Item No. 50 - Overshelf.

ITEM # 51 SCALE

Quantity: One (1)
Manufacturer: Doran Scales
Model: 7000XL

1. Provide manufacturer's standard.

ITEM # 52 MOBILE STAND

Quantity: One (1)
Manufacturer: Advance Tabco
Model: MT-SS-302

1. One (1) Model MT-SS-302 Equipment Stand, 24"W x 30"D x 24"H, 14/304 stainless steel top, 18 gauge stainless steel adjustable undershelf & legs, adjustable stainless steel bullet feet, NSF
2. One (1) Model TA-25ES Casters, 5" diameter, set of 4 (2 with brakes) with stainless steel for 24" tall tables & mixer stands (capacity 200 lbs per caster)

ITEM # 53 ROLL-IN COMBI OVEN

Quantity: One (1)
Manufacturer: Alto-Shaam
Model: CTP20-20G

1. One (1) Model CTP20-20G Combitherm® CT PROformance™ Combi Oven/Steamer, gas, boiler-free, floor model with roll-in cart, (20) non-tilt support rails, (20) 18" x 26" full size sheet or (40) 12" x 20" full size hotel pan (1/1 GN) capacity, PROtouch control with steam/convection/combi and retherm cooking modes, programmable cool-down, SafeVent™ steam venting, removable single-point temperature probe, (3) power levels, (4) cooking modes, CombiClean PLUS™ with (5) cleaning levels, CoolTouch3™ glass window, door hinged right, high efficiency LED lighting, stainless steel construction, seismic legs, 266,000 BTU, EcoSmart®, cULus, UL EPH ANSI/NSF 4, CE, IP X5, Gastec, ENERGY STAR®
2. Provide unit with gas pressure regulator.
3. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
4. One (1) 120v/60/1-ph
5. One (1) Model CE-36354 CombiClean® Cleaning Tabs, (90) 18 gram packets each container for CTP/CTC series
6. One (1) Model CE-24750 Combitherm® Spray Cleaning Liquid, (12) 1 quart containers per case
7. One (1) Model CE-27889 Scale Free™ deliming product, 4 lb. bottle, citrus-based, non-corrosive
8. One (1) Model 5017976 Roll-In Pan Cart, 20 shelf pan trolley, 2-9/16" vertical spacing, fits 20-20E, 20-20G, 20-20MW and QC3-100, stainless steel construction, (4) casters (2 locking)
9. One (1) NOTE: Security options not available on recessed door models

ITEM # 54 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Unit to be mounted through splash of Item No. 55 - Mobile Work Table, coordinate installation.
3. Unit to be mounted at 60" A.F.F.

ITEM # 55 MOBILE WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with heavy duty, non-marking casters with brakes.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
4. Coordinate installation with Item No. 54 - Overshelf.

ITEM # 56 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Unit to be mounted through splash of Item No. 57 - Mobile Work Table, coordinate installation.

3. Unit to be mounted at 60" A.F.F.

ITEM # 57 MOBILE WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with heavy duty, non-marking casters with brakes.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
4. Coordinate installation with Item No. 56 - Overshelf.

ITEM # 58 SLICER

Quantity: One (1)
Manufacturer: Hobart
Model: HS9-1

1. One (1) Model HS9-1 Heavy Duty Meat Slicer, automatic, 13" CleanCut™ removable knife with removal tool, anodized finish with (6) interlocks, (3) stroke lengths & (4) stroke speeds, removable meat grip assembly, removable ring guard cover, single action top mounted sharpener with Borazon™ stones, manual lift lever, 1/2 hp motor, 120v/60hz/1-ph NSF cETLus

ITEM # 59 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 59A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 59B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER

Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 60 SPARE NO.

ITEM # 61 SPARE NO.

ITEM # 62 SPARE NO.

ITEM # 63 SPARE NO.

ITEM # 64 MOBILE WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with heavy duty, non-marking casters with brakes.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.

ITEM # 65 MOBILE WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with heavy duty, non-marking casters with brakes.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.

ITEM # 66 SPARE NO.

ITEM # 67 80 QT. MIXER

Quantity: One (1)
Manufacturer: Hobart
Model: HL800-1

1. One (1) Model HL800-1 Legacy Planetary Mixer Only, 80 quart, (4) fixed speeds plus stir speed, gear-driven transmission, 50-minute SmartTimer™, power bowl lift, stainless steel bowl guard, without attachments, 3.0 HP, 200-240v/50/60/3-ph (US & Export configuration)
2. Provide unit with standard accessory package.

ITEM # 68 SPARE NO.

ITEM # 69 SPARE NO.

ITEM # 70 PREP TABLE W/ SINKS

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. One (1) T&S Brass Model MPY-8WLN-12-4C EasyInstall Mini Pre-Rinse Unit, wall mount, 8" center, 12" swivel add-on nozzle, lever handle, quarter-turn compression cartridge, stream regulator tip, 24" stainless steel flex hose, 6" wall bracket, low lead, overhead spring, .65 GPM, 1/2" NPT, EPAAct2005 compliant, NSF
3. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
4. Provide unit with disposer controls mounting bracket.
5. Provide unit with stainless steel sink covers to fit in flush with countertop.
6. Provide unit with 18" high side splash next to Item No. 67 - 60 Qt. Mixer.
7. Provide unit with one (1) 20" x 20" x 9" deep sinks and one (1) 20" x 20" x 12" deep sink.
8. Provide unit with two (2) s/s drawer assemblies with 20" x 20" pan inserts.
9. Coordinate installation with Item No. 74 - Overshelf.
10. Provide unit with two (2) table mounted convenience outlets, one (1) dedicated outlet for Item No. 75 - Slicer, and one (1) table mounted junction box for Item No. 67 - 80 Qt. Mixer.

ITEM # 71 DISPOSER/CONTROLS

Quantity: One (1)
Manufacturer: InSinkErator
Model: SS-200-7-AS101

1. One (1) Model SS-200-7-AS101 SS-200™ Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 2 HP motor, stainless steel construction, includes syphon breaker, (2) solenoid valves, (2) flow control valves, removable splash baffle, stainless steel sink stopper, programmable AquaSaver® Control Center AS-101 with water-saving technology, automatic water saving function, auto reversing, timed run, post flush, adjustable leg kit
2. Coordinate installation with Item No. 70 - Prep Table w/ Sinks.
3. One (1) Short disposer body height, 1" shorter than standard
4. One (1) 208v/60/3-ph, 3.3 amps
5. One (1) Model SYPHON 45DEG Syphon breaker upgrade, chrome, 45° fittings (13412)
6. One (1) Model DEJAMWRENCH Dejamming wrench, fits 6-5/8" opening only (Not for use with throat guard) (13993)

ITEM # 72 SPARE NO.

ITEM # 73 SPARE NO.

ITEM # 74 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit mounted at 60" A.F.F.
3. Coordinate installation with Item No. 70 - Prep Table w/ Sinks.

ITEM # 75 SLICER

Quantity: One (1)
Manufacturer: Hobart
Model: HS9-1

1. One (1) Model HS9-1 Heavy Duty Meat Slicer, automatic, 13" CleanCut™ removable knife with removal tool, anodized finish with (6) interlocks, (3) stroke lengths & (4) stroke speeds, removable meat grip assembly, removable ring guard cover, single action top mounted sharpener with Borazon™ stones, manual lift lever, 1/2 hp motor, 120v/60hz/1-ph NSF cETLus

ITEM # 76 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 76A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 76B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 77 STAGING/PRODUCTION COOLER

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: CUSTOM

1. Provide manufacturer's standard and the following.
2. Verify and coordinate dimensions in the field with the General Contractor or Construction Manager.
3. Provide overall height of unit to be 8'-6" including floor.
4. Provide unit with one (1) additional interwired vapor proof LED light fixture for blast chiller compartment, two (2) for refrigerator compartment, four (4) for prep compartment and one (1) for milk compartment.
5. Provide unit with white patterned aluminum finish in interior and standard patterned aluminum on exposed exterior sides, with the unexposed sides being galvanized. Provide custom color on exposed portion of walk-in facing servery.
6. Provide matching closure panels at sides and to ceiling. Verify ceiling height with the Architect.
7. Provide unit with five (5) stainless steel, self closing doors with Kason #1256 spring assisted hinges, hinged as shown on plan with interior/exterior diamond tread kickplates and a view window and one (1) full height glass self closing doors with Kason #1256 spring assisted hinges, hinged as shown on plan.
8. Provide unit with audio/visual temperature alarm, one for each compartment.
9. Provide heated pressure relief valve for freezer.
10. Provide unit with System 200 Monitoring System
11. All interconnect and control wiring associated with walk-in by Electrical Subcontractor.
12. Provide unit to be on a vinyl screed.
13. Provide plywood backing in panels for installation of z-clips to be used Item No's 88 & 96 - Prep Table w/ Sinks & Work Table.

ITEM # 78 WALK-IN BLAST CHILLER

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: AP26BC-2T-CP

1. Provide manufacturer's standard and the following.
2. Coordinate connection with Item No. 79 - Blast Chiller Condensing Unit.
3. Coordinate refrigeration line runs and electrical control circuits with the General Contractor. Conduit to be sealed inside and out.

ITEM # 79 BLAST CHILLER CONDENSING UNIT

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: BCCP-1

1. Provide manufacturer's standard and the following.
2. Provide unit with R404A Refrigerant

3. Coordinate refrigeration line runs and electrical control circuits with Construction Manager. Conduit to be sealed airtight inside and out.
4. All coring through walls, floors and ceilings coordinated and completed by the Construction Manager.
5. Final connections for electrical control circuits by Electrical Contractor.
6. Provide unit with 24" outdoor stand.
7. Coordinate Interconnection with Item No.'s 78 - Walk-In Blast Chiller.

ITEM # 80 COOLER COIL

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: ADT130

1. Provide manufacturer's standard and the following.
2. Coordinate connection with Item No. 84 - Cooler Condensing Unit.
3. Coordinate refrigeration line runs and electrical control circuits with the General Contractor. Conduit to be sealed inside and out.

ITEM # 81 SPARE NO.

ITEM # 82 SPARE NO.

ITEM # 83 SPARE NO.

ITEM # 84 COOLER CONDENSING UNIT

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: BHT015X6CFM

1. Provide manufacturer's standard and the following.
2. Provide unit with R404A Refrigerant
3. Coordinate refrigeration line runs and electrical control circuits with Construction Manager. Conduit to be sealed airtight inside and out.
4. All coring through walls, floors and ceilings coordinated and completed by the Construction Manager.
5. Final connections for electrical control circuits by Electrical Contractor.
6. Provide unit with 24" outdoor stand.
7. Coordinate Interconnection with Item No. 80 - Cooler Coil

ITEM # 85 COOLER COIL

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: WKE180

1. Provide manufacturer's standard and the following.

2. Coordinate connection with Item No. 85 - Cooler Condensing Unit.
3. Coordinate refrigeration line runs and electrical control circuits with the General Contractor. Conduit to be sealed inside and out.

ITEM # 86 COOLER CONDENSING UNIT

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: BHT020X6CFM

1. Provide manufacturer's standard and the following.
2. Provide unit with R404A Refrigerant
3. Coordinate refrigeration line runs and electrical control circuits with Construction Manager. Conduit to be sealed airtight inside and out.
4. All coring through walls, floors and ceilings coordinated and completed by the Construction Manager.
5. Final connections for electrical control circuits by Electrical Contractor.
6. Provide unit with 24" outdoor stand.
7. Coordinate Interconnection with Item No. 84 - Cooler Coil

ITEM # 87 TRASH BIN

Quantity: One (1)
Manufacturer: Rubbermaid
Model: FG265500GRAY

1. One (1) Model FG265500GRAY BRUTE® Container, without lid, 55 gallon, 26-1/2"D x 33"H, round, reinforced rims, built in handles, double rimmed base, high-impact plastic construction, gray, NSF
2. One (1) Model FG264043BLA BRUTE® Quiet Dolly, 18-1/4"D x 6-5/8"H, non-marking casters, black

ITEM # 88 PREP TABLE W/ SINKS

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Two (2) T&S Brass Model MPY-8WLN-12-4C EasyInstall Mini Pre-Rinse Unit, wall mount, 8" center, 12" swivel add-on nozzle, lever handle, quarter-turn compression cartridge, stream regulator tip, 24" stainless steel flex hose, 6" wall bracket, low lead, overhead spring, .65 GPM, 1/2" NPT, EPAAct2005 compliant, NSF
3. Provide unit with two (2) 20" x 20" x 9" deep sinks and two (2) 20" x 20" x 12" deep sinks.
4. Provide unit with stainless steel sink covers to fit in flush with countertop.
5. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
6. Provide unit with disposer controls mounting bracket.
7. Coordinate installation with Item No. 90 - Overshelf.
8. Provide unit with two (2) table mounted convenience outlets, one (1) dedicated outlet for Item No. 75 - Slicer, and one (1) table mounted junction box for Item No. 67 - 80 Qt. Mixer.

ITEM # 89 DISPOSER/CONTROLS

Quantity: One (1)
Manufacturer: InSinkErator
Model: SS-200-7-AS101

1. One (1) Model SS-200-7-AS101 SS-200™ Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 2 HP motor, stainless steel construction, includes syphon breaker, (2) solenoid valves, (2) flow control valves, removable splash baffle, stainless steel sink stopper, programmable AquaSaver® Control Center AS-101 with water-saving technology, automatic water saving function, auto reversing, timed run, post flush, adjustable leg kit
2. Coordinate installation with Item No. 88 - Prep Table w/ Sinks.
3. One (1) Short disposer body height, 1" shorter than standard
4. One (1) 208v/60/3-ph, 3.3 amps
5. One (1) Model SYPHON 45DEG Syphon breaker upgrade, chrome, 45° fittings (13412)
6. One (1) Model DEJAMWRENCH Dejamming wrench, fits 6-5/8" opening only (Not for use with throat guard) (13993)

ITEM # 90 SPARE NO.

ITEM # 91 SPARE NO.

ITEM # 92 SPARE NO.

ITEM # 93 SPARE NO.

- 1.

ITEM # 94 BUFFALO CHOPPER

Quantity: One (1)
Manufacturer: Hobart
Model: 84186-1

1. One (1) Model 84186-1 Food Cutter with #12 attachment hub, 18" diameter stainless steel bowl 20 RPM, double stainless steel knives 1725 RPM, bowl cover with safety interlock, push/pull on/off switch, one-piece burnished aluminum housing, 3" legs, 115v/60/1-ph, 1 HP, 6' cord with plug

ITEM # 95 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit mounted at 60" A.F.F.
3. Coordinate installation with Item No. 96 - Prep Table w/ Sinks.

ITEM # 96 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with stainless steel sink covers to fit in flush with countertop.
3. Coordinate installation with Item No. 95 - Overshelf.
4. Provide unit with two (2) table mounted convenience outlets, one (1) dedicated outlet for Item No. 75 - Slicer, and one (1) table mounted junction box for Item No. 67 - 80 Qt. Mixer.

ITEM # 97 FOOD PROCESSOR

Quantity: One (1)
Manufacturer: Robot Coupe
Model: R602VV

1. One (1) Model R602VV Combination Food Processor, 7 liter stainless steel bowl with handle, continuous feed kit with kidney shaped & cylindrical shaped hoppers, includes: (1) "S" blade (27124), (1) 3mm grating disc (28058), (1) 3mm slicing disc (28064), variable speed, 300 - 3500 RPM, 120v/60/1-ph, 20.0 amps, 3 HP, NEMA 5-20P, cETLus, ETL-Sanitation
2. One (1) Model LP5DISC LP5Disc, (5) disc package includes: (1) 3/16" grating disc, (1) 1/4" x 1/4" julienne disc, (1) 3/16" slicing disc and (1) 3/8" x 3/8" dicing kit (contains two discs)

ITEM # 98 SLICER

Quantity: One (1)
Manufacturer: Hobart
Model: HS9-1

1. One (1) Model HS9-1 Heavy Duty Meat Slicer, automatic, 13" CleanCut™ removable knife with removal tool, anodized finish with (6) interlocks, (3) stroke lengths & (4) stroke speeds, removable meat grip assembly, removable ring guard cover, single action top mounted sharpener with Borazon™ stones, manual lift lever, 1/2 hp motor, 120v/60hz/1-ph NSF cETLus

ITEM # 99 ROLL-IN PAN RACK

Quantity: Twelve (12)
Manufacturer: New Age
Model: 1335

1. Twelve (12) Model 1335 Roll-In Refrigerator/Proofer Rack, universal, open frame design, 64"H, wide angle slides for (18) 18" x 26" pans, slides on approximately 3" centers, all welded aluminum construction, end loading, (4) 5" platform casters, (2) swivel, (2) swivel with brakes, NSF, Made in USA

ITEM # 100 DRY STORAGE SHELVING

Quantity: Seventeen (17)
Manufacturer: Cambro
Model: EMU244870V4580

1. Seventeen (17) Model EMU244870V4580 Camshelving® Elements Mobile Unit, 24"W x 48"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF

ITEM # 100A DRY STORAGE SHELVING

Quantity: Four (4)
Manufacturer: Cambro
Model: EMU246070V4580

1. Four (4) Model EMU246070V4580 Camshelving® Elements Mobile Unit, 24"W x 60"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF

ITEM # 100B DRY STORAGE SHELVING

Quantity: Six (6)
Manufacturer: Cambro
Model: EMU245470V4580

1. Six (6) Model EMU245470V4580 Camshelving® Elements Mobile Unit, 24"W x 54"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF

ITEM # 100C DRY STORAGE SHELVING

Quantity: One (1)
Manufacturer: Cambro
Model: EMU244270V4580

1. One (1) Model EMU244270V4580 Camshelving® Elements Mobile Unit, 24"W x 42"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16

each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF

ITEM # 100D DRY STORAGE SHELVING

Quantity: Two (2)
Manufacturer: Cambro
Model: EMU243670V4580

1. Two (2) Model EMU243670V4580 Camshelving® Elements Mobile Unit, 24"W x 36"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, brushed graphite, NSF

ITEM # 101 MANUAL CLIPPER

Quantity: One (1)
Manufacturer: PanSaver
Model: 43500

1. Provide manufacturer's standard.
2. Coordinate installation with Item No. 88 - Prep Table w/ Sinks.

ITEM # 102 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 102A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 102B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER

Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 103 DISPOSER/CONTROLS

Quantity: One (1)
Manufacturer: InSinkErator
Model: SS-200-7-AS101

1. One (1) Model SS-200-7-AS101 SS-200™ Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 2 HP motor, stainless steel construction, includes syphon breaker, (2) solenoid valves, (2) flow control valves, removable splash baffle, stainless steel sink stopper, programmable AquaSaver® Control Center AS-101 with water-saving technology, automatic water saving function, auto reversing, timed run, post flush, adjustable leg kit
2. Coordinate installation with Item No. 96 - Prep Table w/ Sinks.
3. One (1) Short disposer body height, 1" shorter than standard
4. One (1) 208v/60/3-ph, 3.3 amps
5. One (1) Model SYPHON 45DEG Syphon breaker upgrade, chrome, 45° fittings (13412)
6. One (1) Model DEJAMWRENCH Dejamming wrench, fits 6-5/8" opening only (Not for use with throat guard) (13993)

ITEM # 104 TRASH BIN

Quantity: Thirteen (13)
Manufacturer: Rubbermaid
Model: 3541

1. Provide manufacturer's standard.

ITEM # 105 PASS-THRU REFRIGERATOR

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: STR1RPT-1S-1S-HC

1. One (1) Model STR1RPT-1S-1S-HC SPEC SERIES® Pass-thru Refrigerator, one-section, stainless steel front & sides, (1) stainless steel door front & rear with locks, cam-lift hinges, digital temperature control, stainless steel interior, (1) interior kit, LED interior lights, 5" castors, R290 Hydrocarbon refrigerant, 1/4 HP, 115v/60/1, 3.8 amps, NEMA 5-15P, MADE IN USA
2. Provide doors hinged as per plan.
3. One (1) Spec Kit #3 - (6) sets of universal type tray slides
4. One (1) 5" castors, set of 4, standard

ITEM # 106 PASS-THRU HEATED CABINET

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.

Model: STR1HPT-1S-1S

1. One (1) Model STR1HPT-1S-1S SPEC SERIES® Pass-Thru Heated Cabinet, one-section, stainless steel front & sides, (1) stainless steel door front & rear with locks, cam-lift hinges, digital temperature control, stainless steel interior, (1) interior kit, 5" castors, 1500W, NEMA 6-15P, 208-230v/60/1-ph, cULus, UL EPH Classified, MADE IN USA
2. Provide doors hinged as per plan.
3. One (1) Spec Kit #3 - (6) sets of universal type tray slides
4. One (1) 5" castors, set of 4, standard

ITEM # 107 BACK WORK COUNTER W/ HAND SINK

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. One (1) T&S Brass Model EC-3102 ChekPoint™ Electronic Faucet, deck mount, single hole, cast spout with vandalism resistant aerator, AC/DC control module, mixing tee, 100-240 VAC adapter
3. Provide with one (1) 10" x 14" x 8" deep integral s/s sink.
4. Provide with one (1) 1/2" x 4" high x 2'-0" long integral side splash.
5. Verify and coordinate all finishes and hardware with the Architect.
6. Verify and coordinate the fabrication with regard to delivery and access into building.
7. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
8. Provide chrome trim ring for piping at penetrations.
9. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
10. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
11. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
12. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
13. Verify all finishes with the Architect.

ITEM # 107A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: GOJO Industries
Model: 2730-12

1. Provide manufacturer's standard and the following.
2. Unit to be mounted at 55" A.F.F.

ITEM # 107B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: San Jamar
Model: T1490TBK

1. One (1) Model T1490TBK Smart System Oceans® Towel Dispenser, with IQ Sensor™, 11-3/4"W x 9-1/4"D x 16-1/2"L, wall mount, holds (1) 8" wide roll; 8.5" diameter and 4" stub roll, touch-less, (3) selectable paper lengths and dispensing delays, Infinity® System automatic transfer, replaceable drive module, self-adjusting sensing field, durable break-resistant plastic, requires 4 D-cell batteries or AC Adapter (not included), translucent black pearl, CE
2. Mount unit 51-1/2" A.F.F. to bottom.

ITEM # 108 SPARE NO.

ITEM # 109 MAIN SERVING COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA

1. Provide as per Foodservice Millwork Drawings and Details.
2. Coordinate installation with Item No's 110, 110A, 111, 111A, 117, 117A, 124 & 124A - Hot Food Wells, Sneeze Guard w/ Heat and Light, Hot Food Wells, Sneeze Guard w/ Heat and Light, Hot Food Wells, Sneeze Guard w/ Heat and Light, Hot Food Wells & Sneeze Guard w/ Heat and Light.
3. Verify and coordinate all finishes and hardware with the Architect.
4. Verify and coordinate the fabrication with regard to delivery and access into building.
5. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
6. Provide chrome trim ring for piping at penetrations.
7. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
8. Cut-outs in countertops for drop-in equipment to have proper heat insulation, insulation, and framework.
9. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
10. Basic configuration to be BSI Contoura construction using 11 gauge stainless steel end panels, 14 gauge galvanized horizontal and vertical structural supports providing integral utility chase concealed by 18 gauge removable back panels. 18 gauge intermediate shelves as required. 18 removable bottom shelf.
11. 18 gauge stainless steel aprons for equipment controls, where required.
12. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
13. Unit to include pre-wired electrical panel for single point connection to building.
14. Provide support for vertical glass panels specified by architect to be mounted to countertop and structure above.

ITEM # 110 HOT/COLD FOOD WELLS

Quantity: One (1)
Manufacturer: Randell
Model: 95805-208Z

1. One (1) Model 95805-208Z Drop-In Hot/Cold Food Unit, electric, (5) 12" x 20" pan size, switch for hot or cold operation, common waterbath, thermostatic controls, stainless steel top corrosion resistant steel exterior, drain & gate valve, 1/4 HP, 120/208v/60/1, 4.4 kw, cUL, UL, NSF, Made in USA

2. Coordinate installation with Item No. 109 - Main Serving Counter.
3. One (1) Model DISSLOUVERS 3 sided louvered enclosure on compressor housing
4. Five (5) Model DIADBR20 Adapter Bar, 20"
5. Five (5) Model DIADBR12 Adapter Bar, 12"

ITEM # 110A SNEEZE GUARD W/ HEAT & LIGHT

Quantity: One (1)
Manufacturer: BSI
Model: ZG9930

1. One (1) Model ZG9930 ZGuard® Food Shield, single, self-service, fully adjustable, 20-1/2" height, 14" wide tempered glass top & lower sneeze guard, 1" diameter tubing double supports, cULus
2. Coordinate installation with Item No. 109 - Main Serving Counter.
3. Verify length with Item No. 110 - Hot Food Wells.
4. Verify all finishes with the Architect.
5. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
6. One (1) Model 605 Stealth™ Warmer & Light Combo, cULus, NSF
7. One (1) Model 3000K 3000K LED Lamp, 110v/50/60/1-ph, cULus, NSF
8. One (1) Model MWU3 Millwork Undercounter Mount, includes narrow flange & stainless steel wood screws, nylon grommet, requires undercounter access, (o.k. for use with cantilever food shields), NSF, UL Listed

ITEM # 111 HOT/COLD FOOD WELLS

Quantity: One (1)
Manufacturer: Randell
Model: 95805-208Z

1. One (1) Model 95805-208Z Drop-In Hot/Cold Food Unit, electric, (5) 12" x 20" pan size, switch for hot or cold operation, common waterbath, thermostatic controls, stainless steel top corrosion resistant steel exterior, drain & gate valve, 1/4 HP, 120/208v/60/1, 4.4 kw, cUL, UL, NSF, Made in USA
2. Coordinate installation with Item No. 109 - Main Serving Counter.
3. One (1) Model DISSLOUVERS 3 sided louvered enclosure on compressor housing
4. Five (5) Model DIADBR20 Adapter Bar, 20"
5. Five (5) Model DIADBR12 Adapter Bar, 12"

ITEM # 111A SNEEZE GUARD W/ HEAT & LIGHT

Quantity: One (1)
Manufacturer: BSI
Model: ZG9930

1. One (1) Model ZG9930 ZGuard® Food Shield, single, self-service, fully adjustable, 20-1/2" height, 14" wide tempered glass top & lower sneeze guard, 1" diameter tubing double supports, cULus
2. Coordinate installation with Item No. 109 - Main Serving Counter.
3. Verify length with Item No. 111 - Hot Food Wells.
4. Verify all finishes with the Architect.

5. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
6. One (1) Model 605 Stealth™ Warmer & Light Combo, cULus, NSF
7. One (1) Model 3000K 3000K LED Lamp, 110v/50/60/1-ph, cULus, NSF
8. One (1) Model MWU3 Millwork Undercounter Mount, includes narrow flange & stainless steel wood screws, nylon grommet, requires undercounter access, (o.k. for use with cantilever food shields), NSF, UL Listed

ITEM # 112 SANDWICH PREP STATION

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: TSSU-60-16-ADA-HC

1. One (1) Model TSSU-60-16-ADA-HC ADA Compliant Sandwich/Salad Unit, (16) 1/6 size (4"D) poly pans, stainless steel insulated cover, 11-3/4"D cutting board, stainless steel top/front/sides, aluminum back, (2) full doors, (4) adjustable PVC coated wire shelves, aluminum interior with stainless steel floor, 3" castors, R290 Hydrocarbon refrigerant, 1/3 HP, 115v/60/1, 6.5 amps, NEMA 5-15P, cULus, UL EPH Classified, 34" work surface height, MADE IN USA
2. One (1) Model 915171 Polyethylene Cutting Board, pre-drilled, 60" x 19" x 1/2" thick (L brackets and tool not included) for TSSU-60
3. One (1) Model 881328 "L" brackets for 19" TSSU cutting board, set (with tool), required with cutting board
4. One (1) Model 861273 Condiment Pan Dividers, 1-1/16" x 12-5/8" (top of cabinet)
5. One (1) Model 865597 Condiment Pan Dividers, 15/16" x 12-5/8" (top of cabinet)
6. One (1) Model 864266 Condiment Pan Dividers, 27/32" x 12-5/8" (top of cabinet)
7. One (1) Model 925281 Condiment Pan Dividers, 1" x 12-9/16" (top of cabinet)
8. One (1) Model 980207FI Exterior Digital Thermometer, rectangular, Fahrenheit/Celsius (Factory install only)
9. One (1) 3" castors, standard

ITEM # 113 BACK WORK COUNTER W/ HAND SINK

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. One (1) ChFaucet Model 1100-HA8-241ABCP Deck Mounted Faucet
3. Provide with one (1) 21" x 21" x 9" deep integral s/s sink.
4. Verify and coordinate all finishes and hardware with the Architect.
5. Verify and coordinate the fabrication with regard to delivery and access into building.
6. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
7. Provide chrome trim ring for piping at penetrations.
8. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
9. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
10. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.

11. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
12. Verify all finishes with the Architect.

ITEM # 113 SPARE NO.

ITEM # 114 PASS-THRU REFRIGERATOR

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: STR1RPT-1S-1S-HC

1. One (1) Model STR1RPT-1S-1S-HC SPEC SERIES® Pass-thru Refrigerator, one-section, stainless steel front & sides, (1) stainless steel door front & rear with locks, cam-lift hinges, digital temperature control, stainless steel interior, (1) interior kit, LED interior lights, 5" castors, R290 Hydrocarbon refrigerant, 1/4 HP, 115v/60/1, 3.8 amps, NEMA 5-15P, MADE IN USA
2. Provide doors hinged as per plan.
3. One (1) Spec Kit #3 - (6) sets of universal type tray slides
4. One (1) 5" castors, set of 4, standard

ITEM # 115 PASS-THRU HEATED CABINET

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: STR1HPT-1S-1S

1. One (1) Model STR1HPT-1S-1S SPEC SERIES® Pass-Thru Heated Cabinet, one-section, stainless steel front & sides, (1) stainless steel door front & rear with locks, cam-lift hinges, digital temperature control, stainless steel interior, (1) interior kit, 5" castors, 1500W, NEMA 6-15P, 208-230v/60/1-ph, cULus, UL EPH Classified, MADE IN USA
2. Provide doors hinged as per plan.
3. One (1) Spec Kit #3 - (6) sets of universal type tray slides
4. One (1) 5" castors, set of 4, standard

ITEM # 116 BACK WORK COUNTER W/ HAND SINK & DUMP SINK

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Provide with one (1) 10" x 14" x 8" deep integral s/s sink and one (1) 21" x 21" x 9" deep sink.
3. One (1) ChFaucet Model 1100-HA8-241ABCP Deck Mounted Faucet
4. Provide with one (1) 1/2" x 4" high x 2'-0" long integral side splash.
5. Verify and coordinate all finishes and hardware with the Architect.
6. Verify and coordinate the fabrication with regard to delivery and access into building.
7. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
8. Provide chrome trim ring for piping at penetrations.
9. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.

10. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
11. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
12. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
13. Verify all finishes with the Architect.

ITEM # 116A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 116B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 117 HOT/COLD FOOD WELLS

Quantity: One (1)
Manufacturer: Randell
Model: 95805-208Z

1. One (1) Model 95805-208Z Drop-In Hot/Cold Food Unit, electric, (5) 12" x 20" pan size, switch for hot or cold operation, common waterbath, thermostatic controls, stainless steel top corrosion resistant steel exterior, drain & gate valve, 1/4 HP, 120/208v/60/1, 4.4 kw, cUL, UL, NSF, Made in USA
2. Coordinate installation with Item No. 109 - Main Serving Counter.
3. One (1) Model DISSLOUVERS 3 sided louvered enclosure on compressor housing
4. Five (5) Model DIADBR20 Adapter Bar, 20"
5. Five (5) Model DIADBR12 Adapter Bar, 12"

ITEM # 117A SNEEZE GUARD W/ HEAT & LIGHT

Quantity: One (1)
Manufacturer: BSI
Model: ZG9930

1. One (1) Model ZG9930 ZGuard® Food Shield, single, self-service, fully adjustable, 20-1/2" height, 14" wide tempered glass top & lower sneeze guard, 1" diameter tubing double supports, cULus
2. Coordinate installation with Item No. 109 - Main Serving Counter.
3. Verify length with Item No. 117 - Hot Food Wells.
4. Verify all finishes with the Architect.
5. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
6. One (1) Model 605 Stealth™ Warmer & Light Combo, cULus, NSF
7. One (1) Model 3000K 3000K LED Lamp, 110v/50/60/1-ph, cULus, NSF
8. One (1) Model MWU3 Millwork Undercounter Mount, includes narrow flange & stainless steel wood screws, nylon grommet, requires undercounter access, (o.k. for use with cantilever food shields), NSF, UL Listed

ITEM # 118 PASS-THRU REFRIGERATOR

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: STR1RPT-1S-1S-HC

1. One (1) Model STR1RPT-1S-1S-HC SPEC SERIES® Pass-thru Refrigerator, one-section, stainless steel front & sides, (1) stainless steel door front & rear with locks, cam-lift hinges, digital temperature control, stainless steel interior, (1) interior kit, LED interior lights, 5" castors, R290 Hydrocarbon refrigerant, 1/4 HP, 115v/60/1, 3.8 amps, NEMA 5-15P, MADE IN USA
2. Provide doors hinged as per plan.
3. One (1) Spec Kit #3 - (6) sets of universal type tray slides
4. One (1) 5" castors, set of 4, standard

ITEM # 119 PASS-THRU HEATED CABINET

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: STR1HPT-1S-1S

1. One (1) Model STR1HPT-1S-1S SPEC SERIES® Pass-Thru Heated Cabinet, one-section, stainless steel front & sides, (1) stainless steel door front & rear with locks, cam-lift hinges, digital temperature control, stainless steel interior, (1) interior kit, 5" castors, 1500W, NEMA 6-15P, 208-230v/60/1-ph, cULus, UL EPH Classified, MADE IN USA
2. Provide doors hinged as per plan.
3. One (1) Spec Kit #3 - (6) sets of universal type tray slides
4. One (1) 5" castors, set of 4, standard

ITEM # 120 BACK WORK COUNTER W/ HAND SINK

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Provide with one (1) 10" x 14" x 8" deep integral s/s sink and one (1) 21" x 21" x 9" deep sink.
3. One (1) ChFaucet Model 1100-HA8-241ABCP Deck Mounted Faucet
4. Provide with one (1) 1/2" x 4" high x 2'-0" long integral side splash.

5. Verify and coordinate all finishes and hardware with the Architect.
6. Verify and coordinate the fabrication with regard to delivery and access into building.
7. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
8. Provide chrome trim ring for piping at penetrations.
9. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
10. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
11. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
12. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
13. Verify all finishes with the Architect.

ITEM # 120A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 120B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 121 FLAMMABLE SAFETY CABINET

Quantity: Two (2)
Manufacturer: Global Industrial
Model: 1045S-50

1. Provide manufacturer's standard.

ITEM # 122 SPARE NO.

ITEM # 123 SPARE NO.

ITEM # 124 HOT/COLD FOOD WELLS

Quantity: One (1)
Manufacturer: Randell
Model: 95805-208Z

1. One (1) Model 95805-208Z Drop-In Hot/Cold Food Unit, electric, (5) 12" x 20" pan size, switch for hot or cold operation, common waterbath, thermostatic controls, stainless steel top corrosion resistant steel exterior, drain & gate valve, 1/4 HP, 120/208v/60/1, 4.4 kw, cUL, UL, NSF, Made in USA
2. Coordinate installation with Item No. 109 - Main Serving Counter.
3. One (1) Model DISSLOUVERS 3 sided louvered enclosure on compressor housing
4. Five (5) Model DIADBR20 Adapter Bar, 20"
5. Five (5) Model DIADBR12 Adapter Bar, 12"

ITEM # 124A SNEEZE GUARD W/ HEAT & LIGHT

Quantity: One (1)
Manufacturer: BSI
Model: ZG9930

1. One (1) Model ZG9930 ZGuard® Food Shield, single, self-service, fully adjustable, 20-1/2" height, 14" wide tempered glass top & lower sneeze guard, 1" diameter tubing double supports, cULus
2. Coordinate installation with Item No. 109 - Main Serving Counter.
3. Verify length with Item No. 124 - Hot Food Wells.
4. Verify all finishes with the Architect.
5. One (1) 3/8" Tempered glass (for shelf or span more than 54", centerline max 66")
6. One (1) Model 605 Stealth™ Warmer & Light Combo, cULus, NSF
7. One (1) Model 3000K 3000K LED Lamp, 110v/50/60/1-ph, cULus, NSF
8. One (1) Model MWU3 Millwork Undercounter Mount, includes narrow flange & stainless steel wood screws, nylon grommet, requires undercounter access, (o.k. for use with cantilever food shields), NSF, UL Listed

ITEM # 125 DUNNAGE RACK

Quantity: Four (4)
Manufacturer: Cambro
Model: DRS360131

1. Four (4) Model DRS360131 S-Series Dunnage Rack, slotted top, 1500 lb. load capacity, 21"D x 36"W x 12"H, polypropylene, one-piece, seamless double wall construction, includes (1) Camlink®, 4" square legs, dark brown, NSF

ITEM # 125A DUNNAGE RACK

Quantity: One (1)
Manufacturer: Cambro
Model: DRS480131

1. One (1) Model DRS480131 S-Series Dunnage Rack, slotted top, 3000 lb. load capacity, 21"D x 48"W x 12"H, polypropylene, one-piece, seamless double wall construction, includes (1) Camlink®, 4" square legs, dark brown, NSF

ITEM # 126 COOLER COIL

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: ADT130

1. Provide manufacturer's standard and the following.
2. Coordinate connection with Item No. 127 - Cooler Condensing Unit
3. Coordinate refrigeration line runs and electrical control circuits with the General Contractor. Conduit to be sealed inside and out.

ITEM # 127 COOLER CONDENSING UNIT

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: BHT015X6CFM

1. Provide manufacturer's standard and the following.
2. Provide unit with R404A Refrigerant
3. Coordinate refrigeration line runs and electrical control circuits with Construction Manager. Conduit to be sealed airtight inside and out.
4. All coring through walls, floors and ceilings coordinated and completed by the Construction Manager.
5. Final connections for electrical control circuits by Electrical Contractor.
6. Provide unit with 24" outdoor stand.
7. Coordinate Interconnection with Item No.'s 126 - Cooler Coil.

ITEM # 128 AIR SCREEN MERCHANDISER

Quantity: One (1)
Manufacturer: Federal Industries
Model: IMSS60SC-2

1. One (1) Model IMSS60SC-2 Specialty Display Island Self-Serve Refrigerated Merchandiser, 60"W x 40"D x 55"H, self contained refrigeration with condensate pump, adjustable temperature control LED top & undershelf lighting, (2) tiers of adjustable black metal shelves, curved air deflector, black metal base, black interior & canopy, choice of laminate, 1-1/2 HP, cULus, UL EPH CLASSIFIED
2. One (1) Cord & plug (6 ft.) (for self-contained units only)
3. One (1) Laminate special color (Formica/Wilsonart) standard offerings. Verify finishes with the Architect.

ITEM # 129 AIR SCREEN MERCHANDISER

Quantity: One (1)
Manufacturer: Federal Industries
Model: IMSS60SC-2

1. One (1) Model IMSS60SC-2 Specialty Display Island Self-Serve Refrigerated Merchandiser, 60"W x 40"D x 55"H, self contained refrigeration with condensate pump, adjustable temperature control LED top & undershelf lighting, (2) tiers of adjustable black metal shelves, curved air deflector, black metal base, black interior & canopy, choice of laminate, 1-1/2 HP, cULus, UL EPH CLASSIFIED
2. One (1) Cord & plug (6 ft.) (for self-contained units only)
3. One (1) Laminate special color (Formica/Wilsonart) standard offerings. Verify finishes with the Architect.

ITEM # 130 SPARE NO.

ITEM # 131 AIR SCREEN MERCHANDISER

Quantity: One (1)
Manufacturer: MVP Group
Model: KGL-RS-40-S

1. One (1) Model KGL-RS-40-S Hydra-Kool Grab-N-Go Open Merchandiser, multiplexible, 40-7/8"W x 36"D x 65"H, digital controller, temperature recorder, HAACP certified, (2) locking rear loading doors, key or manually operated electrical front shutter, (2) adjustable shelves, LED lighting in canopy & under all shelves, PVC coated grey steel interior, silver front panel & grey bottom front panel on exterior, adjustable feet, self-contained refrigeration, 5/8 HP, ETL-Sanitation, cETLus
2. One (1) Other exterior finish colors available
3. One (1) Stainless steel interior finish

ITEM # 132 AIR SCREEN MERCHANDISER

Quantity: One (1)
Manufacturer: MVP Group
Model: KGL-RS-40-S

1. One (1) Model KGL-RS-40-S Hydra-Kool Grab-N-Go Open Merchandiser, multiplexible, 40-7/8"W x 36"D x 65"H, digital controller, temperature recorder, HAACP certified, (2) locking rear loading doors, key or manually operated electrical front shutter, (2) adjustable shelves, LED lighting in canopy & under all shelves, PVC coated grey steel interior, silver front panel & grey bottom front panel on exterior, adjustable feet, self-contained refrigeration, 5/8 HP, ETL-Sanitation, cETLus
2. One (1) Other exterior finish colors available
3. One (1) Stainless steel interior finish

ITEM # 133 AIR SCREEN MERCHANDISER

Quantity: One (1)
Manufacturer: MVP Group
Model: KGL-RS-40-S

1. One (1) Model KGL-RS-40-S Hydra-Kool Grab-N-Go Open Merchandiser, multiplexible, 40-7/8"W x 36"D x 65"H, digital controller, temperature recorder, HAACP certified, (2) locking rear loading doors, key or manually operated electrical front shutter, (2) adjustable shelves, LED

lighting in canopy & under all shelves, PVC coated grey steel interior, silver front panel & grey bottom front panel on exterior, adjustable feet, self-contained refrigeration, 5/8 HP, ETL-Sanitation, cETLus

2. One (1) Other exterior finish colors available
3. One (1) Stainless steel interior finish

ITEM # 134 P.O.S. SYSTEM

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 135 CASHIER COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-MW

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
6. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
7. Equipment controls to be mounted behind doors, where required.
8. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.

ITEM # 136 P.O.S. SYSTEM

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 137 SPARE NO.

ITEM # 138 CASHIER COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-MW

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
5. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
6. Equipment controls to be mounted behind doors, where required.
7. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.

ITEM # 139 P.O.S. SYSTEM

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 140 SPARE NO.

ITEM # 141 AIR SCREEN MERCHANDISER

Quantity: One (1)
Manufacturer: MVP Group
Model: KGL-RS-40-S

1. One (1) Model KGL-RS-40-S Hydra-Kool Grab-N-Go Open Merchandiser, multiplexible, 40-7/8"W x 36"D x 65"H, digital controller, temperature recorder, HAACP certified, (2) locking rear loading doors, key or manually operated electrical front shutter, (2) adjustable shelves, LED lighting in canopy & under all shelves, PVC coated grey steel interior, silver front panel & grey bottom front panel on exterior, adjustable feet, self-contained refrigeration, 5/8 HP, ETL-Sanitation, cETLus
2. One (1) Other exterior finish colors available
3. One (1) Stainless steel interior finish

ITEM # 142 MOBILE CONDIMENT COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.

8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
10. Verify all finishes with the Architect.

ITEM # 143 MOBILE CONDIMENT COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
10. Verify all finishes with the Architect.

ITEM # 144 CASHIER COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-MW

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
5. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
6. Equipment controls to be mounted behind doors, where required.
7. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.

ITEM # 145 P.O.S. SYSTEM

Quantity: One (1)

Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 146 SPARE NO.

ITEM # 147 CASHIER COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-MW

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
5. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
6. Equipment controls to be mounted behind doors, where required.
7. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.

ITEM # 148 WALK-IN COOLER/FREEZER

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: CUSTOM

1. Provide manufacturer's standard and the following.
2. Verify and coordinate dimensions in the field with the General Contractor or Construction Manager.
3. Provide overall height of unit to be 8'-6" including floor.
4. Provide unit with one (1) additional interwired vapor proof LED light fixture for freezer compartment and one (1) for refrigerator compartment.
5. Provide unit with white patterned aluminum finish in interior and standard patterned aluminum on exposed exterior sides, with the unexposed sides being galvanized.
6. Provide matching closure panels at sides and to ceiling. Verify ceiling height with the Architect.
7. Provide unit with two (2) stainless steel, self closing doors with Kason #1256 spring assisted hinges, hinged as shown on plan with interior/exterior diamond tread kickplates and a view window.
8. Provide unit with audio/visual temperature alarm, one for each compartment.
9. Provide heated pressure relief valve for freezer.
10. Provide unit with System 200 Monitoring System
11. All interconnect and control wiring associated with walk-in by Electrical Subcontractor.

ITEM # 149 FREEZER COIL

Quantity: One (1)

Manufacturer: American Panel Corporation
Model: AE26-92B

1. Provide manufacturer's standard and the following.
2. Coordinate connection with Item No. 150 - Freezer Condensing Unit.
3. Coordinate defrost control wiring with Electrical Contractor.
4. Coordinate refrigeration line runs and electrical control circuits with the General Contractor. Conduit to be sealed inside and out.
5. Provide unit with drain line heat tape.

ITEM # 150 FREEZER CONDENSING UNIT

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: FJAM-A300-TFC-020

1. Provide manufacturer's standard and the following.
2. Provide unit with R404A Refrigerant
3. Coordinate refrigeration line runs and electrical control circuits with Construction Manager. Conduit to be sealed airtight inside and out.
4. All coring through walls, floors and ceilings coordinated and completed by the Construction Manager.
5. Final connections for electrical control circuits by Electrical Contractor.
6. Provide unit with 24" outdoor stand.
7. Coordinate Interconnection with Item No. 149 - Freezer Coil

ITEM # 151 MOBILE CONDIMENT COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
10. Verify all finishes with the Architect.

ITEM # 152 MOBILE CONDIMENT COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
10. Verify all finishes with the Architect.

ITEM # 153 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 153A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 153B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 154 COOLER COIL

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: AA28-122

1. Provide manufacturer's standard and the following.
2. Coordinate connection with Item No. 155 - Cooler Condensing Unit
3. Coordinate refrigeration line runs and electrical control circuits with the General Contractor. Conduit to be sealed inside and out.

ITEM # 155 COOLER CONDENSING UNIT

Quantity: One (1)
Manufacturer: American Panel Corporation
Model: BHT015X6CFM

1. Provide manufacturer's standard and the following.
2. Provide unit with R404A Refrigerant
3. Coordinate refrigeration line runs and electrical control circuits with Construction Manager. Conduit to be sealed airtight inside and out.
4. All coring through walls, floors and ceilings coordinated and completed by the Construction Manager.
5. Final connections for electrical control circuits by Electrical Contractor.
6. Provide unit with 24" outdoor stand.
7. Coordinate Interconnection with Item No.'s 154 - Cooler Coil.

ITEM # 156 ICE CUBER W/ BIN

Quantity: One (1)
Manufacturer: Scotsman
Model: C0630MA-32

1. One (1) Model C0630MA-32 Prodigy Plus® Ice Maker, cube style, air-cooled, self-contained condenser, production capacity up to 640 lb/24 hours at 70°/50° (474 lb AHRI certified at 90°/70°), stainless steel finish, medium cube size, 208-230v/60/1-ph, 11.0 amps, cULus, NSF, CE
2. One (1) Model B330P Ice Bin, top-hinged front-opening door, 344 lb application capacity, for top-mounted ice maker, polyethylene liner, rotocast plastic construction, includes 6" legs, NSF
3. One (1) Model AP2-P AquaPatrol™ Plus Water Filtration System, double system, designed for ice makers & beverage equipment, cubers over 650 lb & up to 1200 lb, flakers & nuggets over 1200 lb, cULus, NSF
4. One (1) Model APRC6-P AqualPatrol™ Plus Water Filter Replacement cartridges (package of 6), cULus, NSF

ITEM # 157 LOCKER

Quantity: Fifteen (15)
Manufacturer: BY ARCHITECT
Model: BY ARCHITECT

1. By Architect - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 158 CONDIMENT COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-MW

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
5. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
6. Equipment controls to be mounted behind doors, where required.
7. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.

ITEM # 159 P.O.S. SYSTEM

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 160 CAFE SERVING COUNTER W/ HAND SINK

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. One (1) Advance Tabco Model 1014B-05 Sink, undermount, 1-compartment, 10" wide x 14" front-to-back x 5" deep, drain opening, 12-1/2" x 16-1/2" O.D.. trim size, 20 gauge 304 series stainless steel (NOT FOR USE WITH STANDARD TABLES) (can be used as undermount on non-stainless tops)
3. One (1) T&S Brass Model EC-3102 ChekPoint™ Electronic Faucet, deck mount, single hole, cast spout with vandalism resistant aerator, AC/DC control module, mixing tee, 100-240 VAC adapter
4. Provide with one (1) 1/2" x 4" high x 2'-0" long integral side splash.
5. Verify and coordinate all finishes and hardware with the Architect.
6. Verify and coordinate the fabrication with regard to delivery and access into building.
7. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
8. Provide chrome trim ring for piping at penetrations.
9. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
10. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
11. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal

of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.

12. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
13. Counter front to have premium grade plastic laminate, manufacturer and color as selected by Architect.

ITEM # 160A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 160B TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 161 REFRIGERATED MERCHANDISER

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: GDM-26-HC~TSL01

1. One (1) Model GDM-26-HC~TSL01 Refrigerated Merchandiser, one-section, True standard look version 01, (5) shelves, powder coated steel exterior, white interior with stainless steel floor, (1) Low-E thermal glass hinged door, LED interior lights, R290 Hydrocarbon refrigerant, 1/3 HP, 115v/60/1, 5.4 amps, NEMA 5-15P, cULus, UL EPH Classified, MADE IN USA, ENERGY STAR®
2. Provide door hinged as per plan.
3. One (1) Exterior: Black powder coated steel, standard
4. One (1) Interior: White aluminum, standard
5. One (1) Model S-PW Sign, Plain White in lieu of standard
6. One (1) Castors, 2-1/2", set of 4

ITEM # 162 ESPRESSO CAPPUCCINO MACHINE

Quantity: One (1)
Manufacturer: BUNN
Model: 43400.0000

1. One (1) Model 43400.0000 43400.0000 BUNN Espresso® Sure Tamp™ Steam 2-step Espresso Machine, super-automatic, 2 grinders, compact footprint, standard 7" color touchscreen,

customizable Build-A-Drink™ menu, Picture Prompted Cleaning™, Sure Tamp technology, PEEK Intellisteam® wand, adjustable cup height, Energy-Saver mode, includes installation, training, 1 year Wellness package with BUNNLink® remote diagnostics and Mavea water filtration system, designed & assembled in the USA, 208v/60/1-ph, 4300 watts, 20.4 amps, no plug, Low Lead Certified, RoHS compliant, ETL, NSF (Please contact BUNN to confirm pricing based on the zip code of installed location and to discuss service package options. espresso@bunn.com)

ITEM # 163 COFFEE BREWER

Quantity: One (1)
Manufacturer: BUNN
Model: 23001.0000

1. One (1) Model 23001.0000 23001.0000 CW15-APS Airpot Coffee Brewer, pourover, brews 3.8 gallons per hour capacity, digital timer, plastic funnel, brews into 2.2 to 3.0 liter airpot (sold separately), stainless decor, 120v/60/1-ph, 1370w, 11.4 amps, NEMA 5-15P, cord attached, UL, NSF
2. One (1) Model 30201.0001 30201.0001 ED-17-TL EasyClear® In-Line Water Quality System, low volume, taste/odor & chlorine reduction @ 0.5 gpm, 1,500 gallons of sediment, scale inhibitor, 5 micron, designed for one/two 1/2 gallon coffee brewers, replaces 750 In-Line filter, NSF (12 per case)

ITEM # 164 UNDERCOUNTER FREEZER

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: TUC-48F-LP-HC

1. One (1) Model TUC-48F-LP-HC Low Profile Undercounter Freezer, -10° F, stainless steel top & sides, (2) stainless steel doors, (4) shelves, clear coated aluminum interior with stainless steel floor, 1-1/2" diameter dual wheel castors, 31-7/8" counter height, front breathing, R290 Hydrocarbon refrigerant, 1/2 HP, 115v/60/1, 5.4 amps, NEMA 5-15P, MADE IN USA, ENERGY STAR®
2. One (1) Self-contained refrigeration standard
3. One (1) 1-1/2" diameter dual wheel castors, standard

ITEM # 165 REFRIGERATED/AMBIENT DISPLAY

Quantity: One (1)
Manufacturer: Federal Industries
Model: CD4828/RSS4SC

1. One (1) Model CD4828/RSS4SC Specialty Display Hybrid Merchandiser Refrigerated Self-Serve Bottom With Non-Refrigerated Service Top, 48"W x 39"D x 70"H, refrigerated self-serve bottom: black laminated exterior with black trim, horizontal top & front light, (2) tiers of black metal shelves with black interior, tempered glass ends, non-refrigerated top: glass with black trim, top light with lighted shelves, (2) tier black wire shelves, sliding rear doors, 1/2 HP, UL, UL EPH CLASSIFIED
2. One (1) Stainless steel in lieu of laminate
3. One (1) Energy saving night curtain

ITEM # 166 MOBILE ICE BIN

Quantity: One (1)
Manufacturer: Cambro
Model: ICS100L110

1. One (1) Model ICS100L110 SlidingLid™ Ice Caddy, mobile, 28-3/4"H, 100 lb. capacity, slant top slides up/back into secured top, foam insulation, molded in side grips, lift grips front/back, drain shelf, recessed drain faucet, no assembly required, (4) 5" caster (2 swivel, 2 fixed with brakes), black, NSF

ITEM # 167 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 167A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 167B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 168 SPARE NO.

ITEM # 168A DRY STORAGE SHELVING

Quantity: Three (3)
Manufacturer: Cambro
Model: ESU184272V4580

1. Three (3) Model ESU184272V4580 Camshelving® Elements Starter Unit, 18"W x 42"L x 72"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (8) stationary traverses & (4) bags of 8 count dovetails (16 each A & B), brushed graphite, NSF

ITEM # 168B DRY STORAGE SHELVING

Quantity: One (1)
Manufacturer: Cambro
Model: ESU184872V4580

1. One (1) Model ESU184872V4580 Camshelving® Elements Starter Unit, 18"W x 48"L x 72"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (8) stationary traverses & (4) bags of 8 count dovetails (16 each A & B), brushed graphite, NSF

ITEM # 168C DRY STORAGE SHELVING

Quantity: One (1)
Manufacturer: Cambro
Model: ESU186072V4580

1. One (1) Model ESU186072V4580 Camshelving® Elements Starter Unit, 18"W x 60"L x 72"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (8) stationary traverses & (4) bags of 8 count dovetails (16 each A & B), brushed graphite, NSF

ITEM # 169 WALL SHELF W/ POT HOOKS

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit mounted at 72" A.F.F.

ITEM # 170 POT SINK & CLEAN DISHTABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with three (3) 21" x 27" x 14" deep sinks.
3. Coordinate fabrication with regard to delivery and access into building.
4. Coordinate installation of table limit switch with Item No. 170 - Pot Sink & Clean Dishtable.
5. Coordinate turn-down into Item No. 175 - Dishmachine.

6. Provide unit with disposer controls mounting bracket.

ITEM # 171 AIRPOT

Quantity: Two (2)
Manufacturer: BUNN
Model: 36725.0000

1. Two (2) Model 36725.0000 36725.0000 Airpot, 3.8 liter (128 oz.), lever-action, stainless steel liner, 1-pack, NSF

ITEM # 172 SLICER

Quantity: One (1)
Manufacturer: Hobart
Model: HS9-1

1. One (1) Model HS9-1 Heavy Duty Meat Slicer, automatic, 13" CleanCut™ removable knife with removal tool, anodized finish with (6) interlocks, (3) stroke lengths & (4) stroke speeds, removable meat grip assembly, removable ring guard cover, single action top mounted sharpener with Borazon™ stones, manual lift lever, 1/2 hp motor, 120v/60hz/1-ph NSF cETLus

ITEM # 173 MOBILE WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with heavy duty, non-marking casters.

ITEM # 174 DISPOSER/CONTROLS

Quantity: One (1)
Manufacturer: InSinkErator
Model: SS-200-7-AS101

1. One (1) Model SS-200-7-AS101 SS-200™ Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 2 HP motor, stainless steel construction, includes syphon breaker, (2) solenoid valves, (2) flow control valves, removable splash baffle, stainless steel sink stopper, programmable AquaSaver® Control Center AS-101 with water-saving technology, automatic water saving function, auto reversing, timed run, post flush, adjustable leg kit
2. Coordinate installation with Item No. 174 - Soiled Dishtable w/ Sink.
3. One (1) 208v/60/3-ph, 3.3 amps
4. One (1) Model SYPHON 45DEG Syphon breaker upgrade, chrome, 45° fittings (13412)
5. One (1) Model DEJAMWRENCH Dejamming wrench, fits 6-5/8" opening only (Not for use with throat guard) (13993)

ITEM # 175 DISHMACHINE

Quantity: One (1)
Manufacturer: Champion
Model: 44 PRO

1. One (1) Model 44 PRO Pro Series, 44"W rack conveyor dishwasher, Proportional Rinse, Progressive anti-jam drive system, top mounted Prodigy series HMI user interface, Proactive maintenance software, 100 gallons per hour with energy sentinel (idle pump shut-off), (209) racks per hour, single-piece hood design, single-piece stainless steel upper & lower wash arms manifolds, internal removable scrap basket, dual-piece scrap screens, 20" standard vertical clearance which accommodate 18" x 26" sheet pans, full 180° opening leak proof insulated hinged access doors, automatic tank fill, door safety switches, leak-proof ball valve drains, lower front & side enclosure panels, stainless steel heavy gauge construction including base & legs, electric tank heat, 2 HP wash pump, single point machine & separate booster connection, vent fan control, stainless steel rear manifolds, NSF, cULus
2. Coordinate turn-down from Item No's 9 & 15 - Soiled Dishtable & Pot sink and Clean Dishtable.
3. One (1) Complimentary factory authorized performance test included, upon equipment start-up. Consult local Champion sales representative for coordination of the start-up. If customer is beyond 60 miles from Champion authorized service agent, consult factory.
4. One (1) Right-to-left operation
5. One (1) Voltage to be determined
6. One (1) Electric tank heat, standard
7. One (1) Electric booster, 70° rise, 21kW, built-in
8. One (1) Shock Arrestor (un-mounted)
9. One (1) Drain water tempering kit (un-mounted)
10. One (1) Extended stainless steel vent cowl with 7" stack & locking damper (set)
11. One (1) Higher than standard vertical clearance (consult factory for price)
12. One (1) Table limit switch, whisker style (unmounted) (traditional)

ITEM # 176 MOBILE POT SHELF

Quantity: Two (2)
Manufacturer: Cambro
Model: EMU246070V4580

1. Two (2) Model EMU246070V4580 Camshelving® Elements Mobile Starter Unit, 24"W x 60"L x 70"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (8) mobile traverses & (4) bags of 8 count dovetails (16 each A & B), (4) premium swivel casters with total locking brake, brushed graphite, NSF

ITEM # 177 SOILED DISHTABLE W/ SINK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Three (3) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)

3. Two (2) T&S Brass Model B-0231-CR-K-F10 Pantry Faucet, double, 8" wall mount, 12" swivel nozzle, ceramic cartridges with check valves, lever handles, (2) 24" flexible hoses, installation kit, 1.0 GPM aerator, low lead, ADA Compliant, 1/2" NPT, (B-0230-k)
4. Provide unit with one (1) 21" x 21" x 9" deep sink with stainless steel rack guides.
5. Coordinate turn-down into Item No. 175 - Dishmachine.
6. Coordinate installation of table limit switch with Item No. 175 - Dishmachine.

ITEM # 177A PRE-RINSE ASSEMBLY

Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0133-08C

1. One (1) Model B-0133-08C EasyInstall Pre-Rinse Unit, spring action gooseneck, 8" wall mount, JeTSpray low flow valve 1.20 gallons per minute
2. Provide unit mounted centered over 21" x 21" sink provided on Item No. 170 - Pot Sink & Soiled Dishtable.
3. One (1) Model B-0109-01 wall bracket, 6"
4. One (1) Model B-0230-KIT Inlet Kit, 1/2" NPT nipple, close elbows, 24" flex supply hoses

ITEM # 178 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 178A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 178B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 179 TRASH BIN

Quantity: One (1)
Manufacturer: Rubbermaid
Model: FG265500GRAY

1. One (1) Model FG265500GRAY BRUTE® Container, without lid, 55 gallon, 26-1/2"D x 33"H, round, reinforced rims, built in handles, double rimmed base, high-impact plastic construction, gray, NSF
2. One (1) Model FG264043BLA BRUTE® Quiet Dolly, 18-1/4"D x 6-5/8"H, non-marking casters, black

ITEM # 180 JANITOR SHELVING

Quantity: One (1)
Manufacturer: Cambro
Model: ESU243672V4580

1. One (1) Model ESU243672V4580 Camshelving® Elements Starter Unit, 24"W x 36"L x 72"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (8) stationary traverses & (4) bags of 8 count dovetails (16 each A & B), brushed graphite, NSF

ITEM # 180A JANITOR SHELVING

Quantity: One (1)
Manufacturer: Cambro
Model: ESU244872V4580

1. One (1) Model ESU244872V4580 Camshelving® Elements Starter Unit, 24"W x 48"L x 72"H, 4-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (4) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts with leveling feet installed, pre-assembled post connectors & wedges, (8) stationary traverses & (4) bags of 8 count dovetails (16 each A & B), brushed graphite, NSF

ITEM # 181 EYE WASH STATION

Quantity: One (1)
Manufacturer: T&S Brass
Model: EW-7360B

1. Provide manufacturer's standard and the following.
2. Provide unit mounted according to ADA standards.
3. PC – Provide warm water as required by ANSI Z358.1-2004.

ITEM # 182 CAFE SERVING COUNTER

Quantity: One (1)

Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
10. Counter front to have premium grade plastic laminate, manufacturer and color as selected by Architect.

ITEM # 183 EYE WASH STATION

Quantity: One (1)
Manufacturer: T&S Brass
Model: EW-7360B

1. Provide manufacturer's standard and the following.
2. Provide unit mounted according to ADA standards.
3. PC – Provide warm water as required by ANSI Z358.1-2004.

ITEM # 184 MOP SINK

Quantity: One (1)
Manufacturer: BY PLUMBING CONTRACTOR
Model: BY PLUMBING CONTRACTOR

1. By Plumbing Contractor - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 185 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 185A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 185B TOUCHLESS PAPER TOWEL DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 186 WORK TABLE W/ SINK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 187 & 188 - Overshelf & Work Table w/ Sink.
3. One (1) T&S Brass Model B-0220-061XCRF1 Pantry Mixing Faucet, deck mount, 8" centers, 10" swivel nozzle, ceramic cartridges with check valves, lever handles, 1.0 GPM aerator, 1/2" NPT female, low lead, ADA Compliant, (B-0425-M)
4. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
5. Provide unit with one (1) 21" x 21" x 9" deep sink.
6. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
7. Provide unit with two (2) table mounted convenience outlets.

ITEM # 187 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 186 & 188 - Work Table w/ Sink & Work Table w/ Sink.
3. Provide unit mounted at 60" A.F.F.

ITEM # 188 WORK TABLE W/ SINK

Quantity: One (1)

Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 186 & 187 - Work Table w/ Sink & Overshelf.
3. One (1) T&S Brass Model B-0220-061XCRF1 Pantry Mixing Faucet, deck mount, 8" centers, 10" swivel nozzle, ceramic cartridges with check valves, lever handles, 1.0 GPM aerator, 1/2" NPT female, low lead, ADA Compliant, (B-0425-M)
4. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
5. Provide unit with one (1) 21" x 21" x 9" deep sink.
6. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
7. Provide unit with two (2) table mounted convenience outlets.

ITEM # 189 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 190 & 196 - Overshelf & Work Table.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
4. Provide unit with two (2) table mounted convenience outlets.

ITEM # 190 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit mounted at 60" A.F.F.

ITEM # 191 COUNTERTOP SOUP WARMER

Quantity: Two (2)
Manufacturer: APW Wyott
Model: RW-2V

1. Two (2) Model RW-2V Food Pan Warmer, electric, countertop, 11 quart capacity (pan not included), thermostatic controls, stainless steel interior & exterior, UL, CSA, CE
2. Two (2) Model 21395 Inset, for 11 qt. warmers, cookers, kettles

ITEM # 192 OVERHEAD HEATED LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: UGAL-48

1. One (1) Model UGAL-48 Ultra-Glo® Infrared Foodwarmer, standard wattage, with lights, single ceramic tile with aluminum housing, 48" wide, with remote or attached control box, adjustable angle brackets, NSF, cULus, Made in USA
2. Coordinate installation with Item No. 209 - Double Overshelf.
3. One (1) Model RMB-UGA Remote Control Enclosure, toggle switch(es), (1) indicator light in lieu of attached switch (Available at time of purchase only)
4. One (1) Model STANDARD Clear Anodized Aluminum (housing), standard (Available at time of purchase only)
5. One (1) Model HTLEADS10 6' - 10' Extended Electrical Leads (Available at time of purchase only)
6. One (1) Model STANDARD Clear Anodized Aluminum, standard (Available at time of purchase only)

ITEM # 193 OVERHEAD HEATED LAMP

Quantity: One (1)
Manufacturer: Hatco
Model: UGAL-48

1. One (1) Model UGAL-48 Ultra-Glo® Infrared Foodwarmer, standard wattage, with lights, single ceramic tile with aluminum housing, 48" wide, with remote or attached control box, adjustable angle brackets, NSF, cULus, Made in USA
2. Coordinate installation with Item No. 209 - Double Overshelf.
3. One (1) Model RMB-UGA Remote Control Enclosure, toggle switch(es), (1) indicator light in lieu of attached switch (Available at time of purchase only)
4. One (1) Model STANDARD Clear Anodized Aluminum (housing), standard (Available at time of purchase only)
5. One (1) Model HTLEADS10 6' - 10' Extended Electrical Leads (Available at time of purchase only)
6. One (1) Model STANDARD Clear Anodized Aluminum, standard (Available at time of purchase only)

ITEM # 194 MOBILE PROOFING CABINET

Quantity: One (1)
Manufacturer: Eagle Group
Model: PCFNLSI-RA2.25

1. One (1) Model PCFNLSI-RA2.25 Panco® Proofing Cabinet, full-size, insulated, TEMP-GARD® air flow design, (12) sets removable wire slides, 2-1/4" OC, digital temperature control with LCD readout, adjustable humidity control, full 270° open swing door with polycarbonate window & magnetic latch, high-temperature protection device with caution alarm & auto-reset, full perimeter bumper, aluminum construction, bottom-mount heat/humidity unit, 5" polymer swivel casters ((2) with brakes), 8' cord, UL, NSF

ITEM # 195 DOUGH DIVIDER

Quantity: One (1)
Manufacturer: Doyon Baking Equipment
Model: MDF820

1. One (1) Model MDF820 Dough Divider, manual, countertop, 20 piece, divides up to 2 - 14 ounce portions, stainless steel dough pan & cutting knives

ITEM # 196 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with three (3) s/s drawer assemblies with 20" x 20" s/s pan inserts.
3. Provide unit with two (2) table mounted convenience outlets.

ITEM # 197 WOOD TOP BAKER'S TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with two (2) table mounted convenience outlets.
3. Provide unit with butcher block tabletop.

ITEM # 198 MOBILE MIXER STAND

Quantity: One (1)
Manufacturer: Advance Tabco
Model: MT-SS-302

1. One (1) Model MT-SS-302 Equipment Stand, 24"W x 30"D x 24"H, 14/304 stainless steel top, 18 gauge stainless steel adjustable undershelf & legs, adjustable stainless steel bullet feet, NSF
2. One (1) Model TA-255 Casters, expanding adapter, for 1-5/8" dia. O.D. tube/table legs, 400 lb capacity per caster, set of (4) (2 with brakes)

ITEM # 199 20 QT. MIXER

Quantity: One (1)
Manufacturer: Hobart
Model: HL200-1STD

1. One (1) Model HL200-1STD 100-120/50/60/1; Bench type mixer; with bowl, beater, whip & spiral dough arm, US/EXP configuration
Legacy Planetary Mixer, Bench, 20 quart, (3) fixed speeds plus stir speed, gear-driven transmission, 15-minute SmartTimer™, #12 taper hub, manual bowl lift, stainless steel bowl, aluminum "B" beater, stainless steel "D" wire whip, aluminum "ED" spiral dough arm, stainless steel bowl guard, 1/2 hp, cord with plug
2. Provide unit with standard accessory package.

ITEM # 200 WORK TABLE W/ SINK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 204 & 205 - Overshelf & Work Table w/ Sink.
3. One (1) T&S Brass Model B-0220-061XCRF1 Pantry Mixing Faucet, deck mount, 8" centers, 10" swivel nozzle, ceramic cartridges with check valves, lever handles, 1.0 GPM aerator, 1/2" NPT female, low lead, ADA Compliant, (B-0425-M)
4. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
5. Provide unit with one (1) 21" x 21" x 9" deep sink.
6. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
7. Provide unit with two (2) table mounted convenience outlets.

ITEM # 201 TRASH BIN

Quantity: Fourteen (14)
Manufacturer: Rubbermaid
Model: FG354060GRAY

1. Fourteen (14) Model FG354060GRAY Slim Jim® Container, 23 gallon, 22"W x 11"D x 30"H, with venting channels, molded-in handles, general purpose waste, open type without lid, high-impact plastic construction, gray

ITEM # 202 SPARE NO.

ITEM # 203 SPARE NO.

ITEM # 204 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit mounted at 60" A.F.F.
3. Coordinate installation with Item No. 200 - Work Table w/ Sink.

ITEM # 205 WORK TABLE W/ SINK

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 200 & 204 - Work Table w/ sink & Overshelf.

3. One (1) T&S Brass Model B-0220-061XCRF1 Pantry Mixing Faucet, deck mount, 8" centers, 10" swivel nozzle, ceramic cartridges with check valves, lever handles, 1.0 GPM aerator, 1/2" NPT female, low lead, ADA Compliant, (B-0425-M)
4. One (1) T&S Brass Model B-3950 Waste Valve, twist handle, 3-1/2" sink opening, 2" drain outlet with 1-1/2" adapter (replaces B-3912, B-3916)
5. Provide unit with one (1) 21" x 21" x 9" deep sink.
6. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
7. Provide unit with two (2) table mounted convenience outlets.

ITEM # 206 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 207 & 208 - Overshelf & Work Table
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
4. Provide unit with two (2) table mounted convenience outlets.

ITEM # 207 OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit mounted at 60" A.F.F.
3. Coordinate installation with Item No. 206 & 208 - Work Table & Work Table.

ITEM # 208 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 206 & 207 - Work Table & Overshelf.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
4. Provide unit with two (2) table mounted convenience outlets.

ITEM # 209 DOUBLE OVERSHELF

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide shelves mounted at 54" A.F.F. & 72" A.F.F.
3. Coordinate installation with Item No. 210 & 234 - Work Table & Work Table.

ITEM # 210 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Coordinate installation with Item No's 209 & 234 - Double Overshelf & Work Table.
3. Provide unit with two (2) s/s drawer assemblies with 20" x 20" s/s pan inserts.
4. Provide unit with two (2) table mounted convenience outlets.

ITEM # 211 SPARE NO.

ITEM # 212 SPARE NO.

ITEM # 213 SPARE NO.

ITEM # 214 DOUBLE DECK PIZZA OVEN

Quantity: One (1)
Manufacturer: Blodgett Oven
Model: 911P DOUBLE

1. One (1) Model 911P DOUBLE Pizza Oven, deck-type, gas, 33"W x 22"D deck interior, (2) 7" high sections, (FDTH) 300-650°F mechanical thermostat, QHT Rokite deck, counter-balanced doors with concealed hinges, full angle iron frame, crown angle trim, stainless steel top, front, sides and back, 19" stainless steel legs, flue connector, 27,000 BTU per section, cETLus, NSF
2. Provide unit with gas pressure regulator.
3. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
4. One (1) 19" legs, stainless steel (set), standard
5. One (1) Casters (set)

ITEM # 215 DOUBLE CONVECTION OVEN

Quantity: One (1)
Manufacturer: Blodgett Oven
Model: HV-100G DBL

1. One (1) Model HV-100G DBL HydroVection™ Oven, Gas, full size, double stacked, capacity (10) 18" x 26" pans, glass doors, (10) stainless steel racks and (20) rack positions, cavity vent, manual controls, four speed auto-reversing fan motor, core probe, stainless steel construction, 8-1/2" stainless steel legs with casters and stacking kit, (2) 3/4 HP, 60,000 BTU, ETL, NSF
2. Provide unit with gas pressure regulator.

3. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
4. Two (2) 120v/60/1-ph, 10.0 amps, NEMA 5-20P (per deck), standard
5. Two (2) Backflow preventer
6. One (1) Water pressure regulator (per section)
7. One (1) Model FXI-11+CR Optipure Multi-Stage Water Filtration System
8. One (1) Gas manifold

ITEM # 216 INGREDIENT BIN

Quantity: Nine (9)
Manufacturer: Winco
Model: IB-27

1. Nine (9) Model IB-27 Ingredient Bin, 27 gallon, 15-1/2" x 29-1/2" x 28", transparent polycarbonate lid, clasp sliding lid, scoop, 3" caster wheels with brakes, polypropylene body, white, NSF (Qty Break = 1 each)

ITEM # 217 DOUBLE CONVECTION OVEN

Quantity: One (1)
Manufacturer: Blodgett Oven
Model: DFG-200-ES DBL

1. One (1) Model DFG-200-ES DBL Convection Oven, gas, double-deck, bakery depth, capacity (5) 18" x 26" pans per compartment, (SSD) solid state digital controls, 2-speed fans, interior light, simultaneous operated doors with glass, porcelain crumb tray, stainless steel front, sides & top, 6" stainless steel legs, flue connector, 50,000 BTU each, cETL, NSF, ENERGY STAR®
2. Provide unit with gas pressure regulator.
3. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
4. One (1) 6" plate casters (set), in lieu of legs
5. One (1) Gas manifold

ITEM # 218 DOUBLE CONVECTION OVEN

Quantity: One (1)
Manufacturer: Blodgett Oven
Model: DFG-200-ES DBL

1. One (1) Model DFG-200-ES DBL Convection Oven, gas, double-deck, bakery depth, capacity (5) 18" x 26" pans per compartment, (SSD) solid state digital controls, 2-speed fans, interior light, simultaneous operated doors with glass, porcelain crumb tray, stainless steel front, sides & top, 6" stainless steel legs, flue connector, 50,000 BTU each, cETL, NSF, ENERGY STAR®
2. Provide unit with gas pressure regulator.
3. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1

- SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
4. One (1) 6" plate casters (set), in lieu of legs
 5. One (1) Gas manifold

ITEM # 219 4-BURNER RANGE W/ OVEN

Quantity: One (1)
Manufacturer: Jade Range
Model: JTRH-4-36C

1. One (1) Model JTRH-4-36C Titan™ Heavy Duty Range, gas, 36", (4) 35,000 BTU open burners, infinite controls, convection oven, (2) chrome plated racks, stainless steel oven liner, 6" plate shelf, front, sides, stub back & bottom, 6" adjustable legs, 115v/60/1-ph, 4.0 amps, 1/3 HP, 170,000 BTU, CSAus, NSF
2. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
3. One (1) 3/4" Rear connection, standard
4. One (1) 3/4" Gas regulator supplied with range
5. One (1) Cap & stainless steel manifold cover, left
6. One (1) Cap & stainless steel manifold cover, right
7. One (1) Model DTS-36 Titan™ double-deck Tubular High Shelf, 36", stainless steel
8. One (1) Set of four casters (2 with brakes)

ITEM # 220A EXHAUST HOOD

Quantity: One (1)
Manufacturer: Halton
Model: KVE

1. Provide manufacturer's standard and the following.
2. Provide construction and insulation for 0" clearance on top, sides, rear and front of exhaust hood.
3. Provide Ansul pre-pipe to extent possible.
4. Provide unit with wall mounted light and fan switches.
5. Provide unit to meet all local, state and federal codes.
6. Provide stainless steel hanger rods and brackets.
7. Provide stainless steel closure panels to ceiling on front and sides; verify ceiling height with the General Contractor.
8. Coordinate power shut-off and integration with building system by General Contractor.
9. Verify and coordinate the fabrication with regard to delivery and access into building.
10. Coordinate installation with Item No. 240 - Fire Suppression System.
11. Coordinate installation with Item No. 245 - Marvel System Control Panel.
12. Provide unit with ABD Automatic Balancing Damper.

ITEM # 220B EXHAUST HOOD

Quantity: One (1)
Manufacturer: Halton
Model: KVE

1. Provide manufacturer's standard and the following.
2. Provide construction and insulation for 0" clearance on top, sides, rear and front of exhaust hood.
3. Provide Ansul pre-pipe to extent possible.
4. Provide unit with wall mounted light and fan switches.
5. Provide unit to meet all local, state and federal codes.
6. Provide stainless steel hanger rods and brackets.
7. Provide stainless steel closure panels to ceiling on front and sides; verify ceiling height with the General Contractor.
8. Coordinate power shut-off and integration with building system by General Contractor.
9. Verify and coordinate the fabrication with regard to delivery and access into building.
10. Coordinate installation with Item No. 240 - Fire Suppression System.
11. Coordinate installation with Item No. 245 - Marvel System Control Panel.
12. Provide unit with ABD Automatic Balancing Damper.

ITEM # 220C EXHAUST HOOD

Quantity: One (1)
Manufacturer: Halton
Model: KVE

1. Provide manufacturer's standard and the following.
2. Provide construction and insulation for 0" clearance on top, sides, rear and front of exhaust hood.
3. Provide Ansul pre-pipe to extent possible.
4. Provide unit with wall mounted light and fan switches.
5. Provide unit to meet all local, state and federal codes.
6. Provide stainless steel hanger rods and brackets.
7. Provide stainless steel closure panels to ceiling on front and sides; verify ceiling height with the General Contractor.
8. Coordinate power shut-off and integration with building system by General Contractor.
9. Verify and coordinate the fabrication with regard to delivery and access into building.
10. Coordinate installation with Item No. 241 - Fire Suppression System.
11. Coordinate installation with Item No. 245 - Marvel System Control Panel.
12. Provide unit with ABD Automatic Balancing Damper.

ITEM # 220D EXHAUST HOOD

Quantity: One (1)
Manufacturer: Halton
Model: KVE

1. Provide manufacturer's standard and the following.
2. Provide construction and insulation for 0" clearance on top, sides, rear and front of exhaust hood.
3. Provide Ansul pre-pipe to extent possible.
4. Provide unit with wall mounted light and fan switches.
5. Provide unit to meet all local, state and federal codes.
6. Provide stainless steel hanger rods and brackets.
7. Provide stainless steel closure panels to ceiling on front and sides; verify ceiling height with the General Contractor.
8. Coordinate power shut-off and integration with building system by General Contractor.
9. Verify and coordinate the fabrication with regard to delivery and access into building.
10. Coordinate installation with Item No. 241 - Fire Suppression System.

11. Coordinate installation with Item No. 245 - Marvel System Control Panel.
12. Provide unit with ABD Automatic Balancing Damper.

ITEM # 221 60 QT. MIXER

Quantity: One (1)
Manufacturer: Hobart
Model: HL600-1STD

1. One (1) Model HL600-1STD 200-240/50/60/3/1 Mixer; with bowl, beater, "D" whip, & spiral dough arm; US/EXP configuration
Legacy Planetary Mixer, 2.7 HP, 60 quart, (4) fixed speeds, gear-driven transmission, 50-Minute SmartTimer™, #12 attach hub, power bowl lift, stainless steel bowl, stainless steel bowl guard, "B" beater, "D" wire whip, "ED" dough hook
2. Provide unit with standard accessory package.

ITEM # 222 SPARE NO.

ITEM # 223 SPARE NO.

ITEM # 224 CONVECTION STEAMER

Quantity: One (1)
Manufacturer: Market Forge
Model: ETP-10G

1. One (1) Model ETP-10G ECO-TECH™ PLUS Convection Steamer, floor model, gas, (2) compartments, (5) 12" x 20" x 2-1/2" pan capacity, atmospheric steamer, self contained water filter, automatic water fill, individually controlled by power switch, 60 minute timer, (4) flanged feet, stainless steel interior & exterior, 84,000 BTU, ENERGY STAR®
2. One (1) Everpure Model EV979721 KleenSteam® II Single System, total system for boiler base steamers, 2.5gpm flow rate, delimiting, 7CB5 carbon filter, SS-10 scale inhibitor Cartridge, dip tube, pressure gauge, water shut-off valve & wall bracket
3. Provide unit with gas pressure regulator.
4. One (1) Everpure Model EV961811 Everpure® 7CB5 Filter Cartridge, carbon block, reduces sediments, chlorine taste & odor, 5.0 micron rating, 2.5 gpm flow rate, 10,000 gallon capacity, 10-125 PSI working pressure, 35-100°F operating temperature, NSF
5. One (1) Everpure Model EV969361 7FC5 Replacement Cartridge, 25,000 gallon capacity, 5 micron rating, 2.5 gpm flow rate
6. One (1) 120v/60/1-ph, 2.0 amps, standard

ITEM # 225 WOOD TOP BAKER'S TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with two (2) table mounted convenience outlets.

3. Provide unit with butcher block tabletop.

ITEM # 226 FLOOR TROUGH

Quantity: One (1)
Manufacturer: Pacific Stainless Products
Model: FT12018-SG

1. One (1) Model FT12018-SG Floor Trough, 120"W x 18"D, removable stainless steel subway-style grating, 4" deep trough pan with built-in pitch toward drain, 3" I.P.S. x 3" drain tail piece (no hub connection), 14/304 stainless steel construction, NSF
2. One (1) Model FTAS Anti-Splash Option

ITEM # 227 40 GAL. TILTING KETTLE

Quantity: One (1)
Manufacturer: Market Forge
Model: MT40-EO

1. One (1) Model MT40-EO Tilting Kettle, electric, 40 gallon capacity, manual tilt, 2/3 steam jacket design, 2" draw-off with removable strainer, pan carrier, hinged spring assist cover, 316 stainless steel liner, modular cabinet base, stainless steel construction
2. One (1) Power tilt
3. One (1) Model 98-4216 Water Hose Kit, 60" line with quick disconnect, 3/8" OD (1 hose per kit)
4. One (1) Model 97-6361 Tangent Perforated Strainer, 2" draw-off, stainless steel
5. One (1) Model EKM Etched gallon markings (or 5 -10 gallon increments), per kettle
6. One (1) Model 90-4350 Accessory Kit, for Tilting Kettles (25, and 40 gallon), includes draw-off brush, 36" clean-up brush, 8-1/2" clean-up brush, paddle, whip, and solid strainer
7. One (1) Model PKT Pan Support, tilting kettles (20-100 gallon)

ITEM # 228 HOT FOOD WELLS

Quantity: One (1)
Manufacturer: Randell
Model: 95604-120Z

1. One (1) Model 95604-120Z Drop-In Hot Food Unit, electric, (4) 12" x 20" pan size, wet operation, individual thermostatic controls, stainless steel top corrosion resistant steel exterior, no drain, 120v/60/1-ph, 36.8 amps, 4.4 kw, cUL, UL, NSF, Made in USA
2. Coordinate installation with Item No. 234 - Work Table.
3. Four (4) Model DIADBR12 Adapter Bar, 12"
4. Four (4) Model DIADBR20 Adapter Bar, 20"
5. One (1) Model DICTREXT4 Extended Thermostatic 8 foot Lead for (4) Controls
6. One (1) Model DIDRNMN4 Drains Manifoldded to common gate valve - 4 Well

ITEM # 229 40 GAL. TILTING KETTLE

Quantity: One (1)
Manufacturer: Market Forge
Model: MT40-EO

1. One (1) Model MT40-EO Tilting Kettle, electric, 40 gallon capacity, manual tilt, 2/3 steam jacket design, 2" draw-off with removable strainer, pan carrier, hinged spring assist cover, 316 stainless steel liner, modular cabinet base, stainless steel construction
2. One (1) Power tilt
3. One (1) Model 98-4216 Water Hose Kit, 60" line with quick disconnect, 3/8" OD (1 hose per kit)
4. One (1) Model 97-6361 Tangent Perforated Strainer, 2" draw-off, stainless steel
5. One (1) Model EKM Etched gallon markings (or 5 -10 gallon increments), per kettle
6. One (1) Model 90-4350 Accessory Kit, for Tilting Kettles (25, and 40 gallon), includes draw-off brush, 36" clean-up brush, 8-1/2" clean-up brush, paddle, whip, and solid strainer
7. One (1) Model PKT Pan Support, tilting kettles (20-100 gallon)

ITEM # 230 30 GALLON TILTING SKILLET

Quantity: One (1)
Manufacturer: Market Forge
Model: 30P-STGM

1. One (1) Model 30P-STGM Tilting Skillet, gas, 30 gallon capacity, 9.5" deep skillet pan with etched gallon markings, modular enclosed cabinet base, standard with manual tilt mechanism, spring assist cover, stainless steel pan and frame, 93,000 BTU
2. Provide unit with gas pressure regulator.
3. One (1) Spark pilot ignition system
4. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
5. One (1) Model 98-6012 Power Tilt
6. One (1) Model 91-5131 Steam Pan Holder Inserts, 12" x 20", pan not included, each
7. One (1) Model 98-6006 Kit, pan support for skillet
8. One (1) Model 98-6017 Draw Off Valve Kit, 2" tangent, with drain kit hose assembly
9. One (1) Model 98-6010 Draw-Off Strainer, 2"
10. One (1) Model 98-6003 Double Pantry Faucet, complete kit with brackets and plumbing
11. One (1) Model 98-6007 Caster Kit

ITEM # 231 WALL FLASHING

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Detail F2-39A

ITEM # 232 SPARE NO.

ITEM # 233 SPARE NO.

ITEM # 234 WORK TABLE

Quantity: One (1)
Manufacturer: Fabricator
Model: CUSTOM

1. Provide as per Foodservice Fabrication Drawings and Details.
2. Provide unit with one (1) s/s drawer assembly with 20" x 20" s/s pan inserts.
3. Coordinate installation with Item No's 209 & 210 - Double Overshelf & Work Table.

ITEM # 235 6-BURNER RANGE W/CONVECTION OVEN

Quantity: One (1)
Manufacturer: Jade Range
Model: JTRH-6-36C

1. One (1) Model JTRH-6-36C Titan™ Heavy Duty Range, gas, 36", (6) 35,000 BTU open burners, infinite controls, convection oven, (2) chrome plated racks, stainless steel 6" plate shelf, front, sides, stub back & bottom, 6" adjustable legs, 115v/60/1-ph, 4.0 amps, 1/3 HP, 240,000 BTU, CSAus, NSF
2. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
3. One (1) 3/4" Rear connection, standard
4. One (1) 3/4" Gas regulator supplied with range
5. One (1) Cap & stainless steel manifold cover, left
6. One (1) Model DTS-72 Titan™ double-deck Tubular High Shelf, 72", stainless steel. Coordinate installation with Item No. 236 - 6-Burner Range w/ Oven.
7. One (1) Battery/Unitization charge, includes 1-1/4" front manifold, common plate shelf and common stub back (when applicable), per unit. Coordinate installation with Item No. 236 - 6-Burner Range w/ Oven.
8. One (1) Set of four casters (2 with brakes)

ITEM # 236 6 BURNER RANGE WITH CONVECTION OVEN

Quantity: One (1)
Manufacturer: Jade Range
Model: JTRH-6-36C

1. One (1) Model JTRH-6-36C Titan™ Heavy Duty Range, gas, 36", (6) 35,000 BTU open burners, infinite controls, convection oven, (2) chrome plated racks, stainless steel 6" plate shelf, front, sides, stub back & bottom, 6" adjustable legs, 115v/60/1-ph, 4.0 amps, 1/3 HP, 240,000 BTU, CSAus, NSF
2. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
3. One (1) 3/4" Rear connection, standard
4. One (1) 3/4" Gas regulator supplied with range
5. One (1) Cap & stainless steel manifold cover, left
6. One (1) Battery/Unitization charge, includes 1-1/4" front manifold, common plate shelf and common stub back (when applicable), per unit. Coordinate installation with Item No. 235 - 6-Burner Range w/ Oven.

7. One (1) Set of four casters (2 with brakes)

ITEM # 237 SANDWICH PREP STATION

Quantity: One (1)
Manufacturer: True Manufacturing Co., Inc.
Model: TSSU-60-16-ADA-HC

1. One (1) Model TSSU-60-16-ADA-HC ADA Compliant Sandwich/Salad Unit, (16) 1/6 size (4"D) poly pans, stainless steel insulated cover, 11-3/4"D cutting board, stainless steel top/front/sides, aluminum back, (2) full doors, (4) adjustable PVC coated wire shelves, aluminum interior with stainless steel floor, 3" castors, R290 Hydrocarbon refrigerant, 1/3 HP, 115v/60/1, 6.5 amps, NEMA 5-15P, cULus, UL EPH Classified, 34" work surface height, MADE IN USA
2. One (1) Model 915171 Polyethylene Cutting Board, pre-drilled, 60" x 19" x 1/2" thick (L brackets and tool not included) for TSSU-60
3. One (1) Model 881328 "L" brackets for 19" TSSU cutting board, set (with tool), required with cutting board
4. Four (4) Model 861273 Condiment Pan Dividers, 1-1/16" x 12-5/8" (top of cabinet)
5. Four (4) Model 865597 Condiment Pan Dividers, 15/16" x 12-5/8" (top of cabinet)
6. Four (4) Model 864266 Condiment Pan Dividers, 27/32" x 12-5/8" (top of cabinet)
7. Four (4) Model 925281 Condiment Pan Dividers, 1" x 12-9/16" (top of cabinet)
8. One (1) Model 980207FI Exterior Digital Thermometer, rectangular, Fahrenheit/Celsius (Factory install only)
9. One (1) 3" castors, standard

ITEM # 238 FRYER ASSEMBLY

Quantity: One (1)
Manufacturer: Pitco Frialator
Model: SSH55-2FD

1. One (1) Model SSH55-2FD Solstice Supreme™ High Efficiency Prepackaged Fryer System with Solstice™ Filter Drawer System, gas, (2) 40-50 lb. oil capacity full tanks, solid state controls, boil out & melt cycle, drain valve interlock, matchless ignition, self-clean burner, downdraft protection, stainless steel tank, front & sides, under-fryer drawer filtration, total 160,000 BTU (-FF), ENERGY STAR®, CSA, NSF, CE
2. Provide unit with gas pressure regulator.
3. One (1) Dormont Model 1675KIT2S36PS Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 36" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, 1 pair Safety Set® with adhesive foam tape and hardware mounting options, limited lifetime warranty
4. One (1) Digital Controller
5. One (1) Twin automatic basket lifts, per battery
6. One (1) Model P6072145 Basket, (2) oblong/twin size, 13-1/2" x 6-1/2" x 5-1/2" deep, long handle, regular mesh (shipped std (n/c) with models "T" SG14, SG14R, SSH55, SE14, SE14X, SE14B, SG14T, 35+, 45+, fryer batteries shipped with (1) per fryer
7. One (1) Model A5062506 Splash Guard, 8". Provide on left side of battery facing Item No. 236 - 6-Burner Range w/ Oven.
8. One (1) Model A3301001 Clean Out Rod, for cleaning fryer drain line
9. One (1) Model PP10056 Fryer Cleaning Brush, high temperature
10. One (1) Model B7490701 Crumb Scoop, designed to fit between gas fryer tubes for removal of heavy sediment

11. One (1) Model PP10725 Skimmer- used for removing food particles from surface oil
12. One (1) Model B3901504 Casters, 9" adjustable swivel non-lock rear & lock front casters, for battery of (2) Solstice gas and electric fryers, batteries and retherms

ITEM # 239 HAND SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 7-PS-90

1. One (1) Model 7-PS-90 Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
2. One (1) Model 7-PS-17 Welded Side Splash, 7-3/4"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM # 239A TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 239B TOUCHLESS SOAP DISPENSER

Quantity: One (1)
Manufacturer: BY OWNER
Model: BY OWNER

1. By Owner - Verify and coordinate all dimensions, details and utility requirements in the field with the General Contractor/ Construction Manager.

ITEM # 240 FIRE SUPPRESSION SYSTEM

Quantity: One (1)
Manufacturer: Ansul Fire Protection
Model: R-102

1. Provide manufacturer's standard and the following.
2. Unit to provide fire protection for Exhaust Hood - Item No. 25L, 25R, 40L & 40R and cooking equipment below.
3. System to be wet chemical-type fire protection system used to protect appliance surfaces, hood exhaust collars and plenum, in accordance with NFPA 17A and 96, UL 300, and in accordance with the local authority having jurisdiction.
4. Ventilator manufacturer to factory pre-pipe to the extent possible. Chemical line piping to run above.
5. Food Service Contractor to furnish mechanical gas solenoid type shut-off valves, and provide them to the Plumbing Subcontractor for installation.

6. All final electrical connections to valves and reset delays by Electrical Subcontractor.
7. System to include a remote, manual-pull, activation station and the certified site Ansul installer is to perform a discharge test
8. Provide all accessories for a completely installed and operational fire protection system including but not limited to piping, nozzles, valves, remote pull stations and tanks.
9. Electrical Subcontractor shall provide interconnection to building alarm system and Marvel System.
10. Electrical subcontractor to provide all interconnect wiring required in accordance with NFPA 17A.
11. Provide unit with four (4) electrical dry contacts for use by Building Management System.

ITEM # 241 SPARE NO.

ITEM # 242 FIRE SUPPRESSION SYSTEM

Quantity: One (1)
Manufacturer: Ansul Fire Protection
Model: R-102

1. Provide manufacturer's standard and the following.
2. Unit to provide fire protection for Exhaust Hood - Item No. 220A, 220B, 220C & 220D and cooking equipment below.
3. System to be wet chemical-type fire protection system used to protect appliance surfaces, hood exhaust collars and plenum, in accordance with NFPA 17A and 96, UL 300, and in accordance with the local authority having jurisdiction.
4. Ventilator manufacturer to factory pre-pipe to the extent possible. Chemical line piping to run above.
5. Food Service Contractor to furnish mechanical gas solenoid type shut-off valves, and provide them to the Plumbing Subcontractor for installation.
6. All final electrical connections to valves and reset delays by Electrical Subcontractor.
7. System to include a remote, manual-pull, activation station and the certified site Ansul installer is to perform a discharge test
8. Provide all accessories for a completely installed and operational fire protection system including but not limited to piping, nozzles, valves, remote pull stations and tanks.
9. Electrical Subcontractor shall provide interconnection to building alarm system and Marvel System.
10. Electrical subcontractor to provide all interconnect wiring required in accordance with NFPA 17A.
11. Provide unit with four (4) electrical dry contacts for use by Building Management System.

ITEM # 243 SPARE NO.

ITEM # 244 MARVEL SYSTEM CONTROL PANEL

Quantity: One (1)
Manufacturer: Halton
Model: MARVEL DCV

1. Provide manufacturer's standard and the following.
2. Foodservice Contractor responsible for all field coordination between Fire Suppression System, Exhaust Hoods, Exhaust Control System and associated Trades.
3. Coordinate interconnection of marvel control system with hood No.'s 25L, 25R, 40L & 40R

4. Halton M.A.R.V.E.L. system to come equipped with hood mounted infrared cooking activity sensors capable of measuring appliance surface temperatures. Infrared sensor will read appliance surface temperature which will be translated by the specific calculation algorithm for that appliance and will respond proactively to any change in cooking status. Infrared sensor and exhaust collar mounted temperature sensor work in concert on differential temperature reading back of the controller.
5. System to also come equipped with utility cabinet and VFDs to control fan speeds. The M.A.R.V.E.L. system shall automatically control the speed of the exhaust fan and supply fan based on appliances status, cooking activities and exhaust air temperatures.
6. Electrical contractor to be responsible for wiring between the supplied Halton M.A.R.V.E.L. control panel and hood mounted sensors. Electrical Contractor will also be responsible for wiring between Halton M.A.R.V.E.L. control panel and the VFD's and then from the VFD's to the exhaust/supply fan motors. Halton to provide interconnectivity cables between the hoods and associated control panels. Halton to provide room temperature sensor. Electrical Contractor to provide labor to run cables and required control power per submittal drawings.
7. Field Start-up to be performed by Halton Authorized Service Agency.
8. Coordinate interconnection with variable speed exhaust fans.
9. Foodservice Equipment Contractor shall provide and coordinate all data lines, electrician interconnections & control wiring between Marvel Control System, VFD's and Exhaust Hoods.

ITEM # 245 MARVEL SYSTEM CONTROL PANEL

Quantity: One (1)
Manufacturer: Halton
Model: MARVEL DCV

1. Provide manufacturer's standard and the following.
2. Foodservice Contractor responsible for all field coordination between Fire Suppression System, Exhaust Hoods, Exhaust Control System and associated Trades.
3. Coordinate interconnection of marvel control system with hood No.'s 220A, 220B, 220C & 220D
4. Halton M.A.R.V.E.L. system to come equipped with hood mounted infrared cooking activity sensors capable of measuring appliance surface temperatures. Infrared sensor will read appliance surface temperature which will be translated by the specific calculation algorithm for that appliance and will respond proactively to any change in cooking status. Infrared sensor and exhaust collar mounted temperature sensor work in concert on differential temperature reading back of the controller.
5. System to also come equipped with utility cabinet and VFDs to control fan speeds. The M.A.R.V.E.L. system shall automatically control the speed of the exhaust fan and supply fan based on appliances status, cooking activities and exhaust air temperatures.
6. Electrical contractor to be responsible for wiring between the supplied Halton M.A.R.V.E.L. control panel and hood mounted sensors. Electrical Contractor will also be responsible for wiring between Halton M.A.R.V.E.L. control panel and the VFD's and then from the VFD's to the exhaust/supply fan motors. Halton to provide interconnectivity cables between the hoods and associated control panels. Halton to provide room temperature sensor. Electrical Contractor to provide labor to run cables and required control power per submittal drawings.
7. Field Start-up to be performed by Halton Authorized Service Agency.
8. Coordinate interconnection with variable speed exhaust fans.
9. Foodservice Equipment Contractor shall provide and coordinate all data lines, electrician interconnections & control wiring between Marvel Control System, VFD's and Exhaust Hoods.

ITEM # 246 RECYCLING BIN

Quantity: Six (6)
Manufacturer: Rubbermaid
Model: FG395973BLUE

1. Six (6) Model FG395973BLUE Recycling Container, 50 gallon, 19-1/2" x 34-1/4"H, square, with recycle symbol, durable, easy-to-clean, dark blue, Made in USA

ITEM # 247 TRASH BIN

Quantity: Eight (8)
Manufacturer: Rubbermaid
Model: FG395900GRAY

1. Eight (8) Model FG395900GRAY Untouchable® Container, 50 gallon, 19-1/2" square x 34-1/4"H, durable, crack resistant, plastic construction, gray, NSF, ADA compliant, Made in USA

ITEM # 248 TRASH-RECYCLE COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
10. Verify all finishes with the Architect.

ITEM # 249 TRASH-RECYCLE COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.

7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
10. Verify all finishes with the Architect.

ITEM # 250 TRASH-RECYCLE COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
10. Verify all finishes with the Architect.

ITEM # 251 TRASH-RECYCLE COUNTER

Quantity: One (1)
Manufacturer: BSI
Model: CONTOURA-AF

1. Provide as per Foodservice Millwork Drawings and Details.
2. Verify and coordinate all finishes and hardware with the Architect.
3. Verify and coordinate the fabrication with regard to delivery and access into building.
4. Provide penetrations in base for indirect waste piping coordinated with floor sink locations.
5. Provide chrome trim ring for piping at penetrations.
6. Counter to be manufactured by FSC (Forest Stewardship Council) Certified Fabricator.
7. Holes in countertop for utilities and supply lines to be built-up with single layer of solid surface material to prevent spillage from seeping into holes.
8. Basic configuration to be BSI Contoura-AF construction using 1 1/2" x 1 1/2" x 1/8" galvanized steel frame. 18 gauge removable bottom shelf set into bottom frame with finger hole for removal of shelf. Maximum spacing for supports to be 24" on center and a 1 1/2" x 1 1/2" x 1/8" support on

- each side of a countertop penetration. All welds on frame to be painted with an approved paint to ensure no corrosion at weld.
9. Provide unit with 14 gauge stainless steel protection strip along bottom edge to protect counter front finishes.
 10. Verify all finishes with the Architect.

End of Section

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Section 11 53 00
LABORATORY EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Chemical storage cabinets.
 - 2. Flammable material storage cabinets.
 - 3. Safety glass goggle cabinets.
 - 4. Glassware washers.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.
- E. Section 11 53 13 - LABORATORY FUME HOODS: Laboratory fume hoods, related component fittings, fixtures, and accessories.
- F. Section 12 35 53 - LABORATORY CASEWORK: Manufactured laboratory casework.
- G. Division 22 - PLUMBING: Connections to all plumbing work furnished under this Section.
- H. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Fume hood vent connections and ductwork (from hood duct collar to hood exhaust system). Venting at storage cabinets.
- I. Division 26 - ELECTRICAL: Electrical work related to items in this Section

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - 2. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
 - 3. Selection samples: Sample card indicating Manufacturer's full range of colors available for selection by Architect.
 - 4. LEED Submittal Requirements:

- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
5. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Do not deliver equipment to the project until all concrete, masonry, plaster and other wet work has been completed and dry.
- C. Deliver and store equipment in original, sealed packaging showing manufacturer's identification and model number.
- D. Protect equipment from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

PART 2 - PRODUCTS

2.1 SCIENCE CLASSROOM EQUIPMENT

- A. Chemical Storage Cabinets:
 1. Corrosives/Acids Cabinets
 - a. Corrosives Storage Cabinet Type I (Chemical Storage A334): 18 gauge steel safety cabinet, equal to Justrite Manufacturing Company, Inc., Des Plaines, IL, model no. 8913222, product "ChemCor Piggyback Corrosives/Acids Safety Cabinet".
 - 1) OSHA compliant.
 - 2) Capacity: 12 gallon.
 - 3) Number of doors: 2, self-closing.
 - 4) Dimensions:
 - a) Exterior: 43 inches wide by 18 inches high by 18 inches deep.
 - b) Interior: 39.5 inches wide by 13 inches high by 14.6 inches deep.
 - 5) Quantity: Three (3)
 - 6) Color: Blue.
 - b. Corrosives Storage Cabinet Type II (Chemical Storage A334): 18 gauge steel safety cabinet, equal to Justrite Manufacturing Company, Inc., Des

Plaines, IL, model no. 8613282, product "ChemCor Piggyback Hazardous Material Safety Cabinet".

- 1) OSHA compliant.
 - 2) Capacity: 12 gallon.
 - 3) Number of doors: 2, self-closing.
 - 4) Dimensions:
 - a) Exterior: 43 inches wide by 18 inches high by 18 inches deep.
 - b) Interior: 39.5 inches wide by 13 inches wide by 14.6 inches deep.
 - 5) Quantity: One (1).
 - 6) Color: Royal Blue.
- c. Corrosives Storage Cabinet Type III (Chemical Storage A334): high-density polyethylene safety cabinet, equal to Justrite Manufacturing Company, Inc., Des Plaines, IL, model no. 24180, product "Polyethylene Corrosives and Acid Cabinet".
- 1) Capacity: 90 liters.
 - 2) Number of doors: 2; manual.
 - 3) Number of shelves: 1; adjustable.
 - 4) Dimensions:
 - a) Exterior: 36 inches wide by 35 inches high by 25 inches deep.
 - b) Interior: 31.3 inches wide by 28 inches wide by 18 inches deep.
 - 5) Quantity: One (1).
 - 6) Color: Blue.
- d. Corrosives Storage Cabinet Type IV (Science Prep Rooms): 18 gauge steel safety cabinet, equal to Justrite Manufacturing Company, Inc., Des Plaines, IL, model no. 892322, product "Sure-Grip EX Undercounter Corrosives/Acid Steel Safety Cabinet.
- 1) Capacity: 22 gallon.
 - 2) Number of doors: 2; self-closing.
 - 3) Number of shelves: 1, adjustable.
 - 4) Dimensions:
 - a) Exterior: 35 inches wide by 35 inches high by 22 inches deep.
 - b) Interior: 31.8 inches wide by 27.4 inches wide by 18.8 inches deep.
 - 5) Quantity: Seven (7); one at each designated science prep room.
 - 6) Color: Blue.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Justrite Manufacturing Company, Inc., Des Plaines, IL.
 2. Eagle Manufacturing Company, Wellsburg, WV.
 3. Scientific Materials Company, Inc., Batavia, IL.
 4. Securall/A & A Sheet Metal Products, LaPorte, IN.
- D. Safety Glass Goggle Cabinet:

1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Thermo Fisher Hamilton Model No. 58L02110.
 2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Thermo Fisher Scientific, Two Rivers, WI.
 - b. Sellstrom Manufacturing Company, Palatine, IL.
 - c. Institutional Casework, Inc., Campbell Rhea, Paris, TN.
 - d. Kewaunee Scientific Corporation, Statesville, NC.
 3. Features: 24 gauge steel fabricated case with white enamel finish, automatically timed germicidal lamp with plug cord for 115 v single phase outlet, key locked with vault rods. Safety interlock switch turns off UV light when doors are opened.
 4. Size: 9-1/2 inches deep by 24-1/2 inches wide by 32 inches high with a capacity of holding 30 pairs of chemical splash goggles.
- E. Glassware Washer:
1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Labconco "Undercounter Flask Scrubber 33 Glassware Washer Model No. 4578120".
 2. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Labconco Corporation, Kansas City, MO.
 - b. VWR International, LLC.
 - c. Lancer Sales USA, Lake Mary, FL.
 3. Description: Stainless steel construction inside and out with microprocessor cycle programming with touchpad controls.
 4. Features: 7 cycle programs, 6 rinse options, LCD, forced air drying with dual heaters. Detergent and neutralizer dispensers, particle filter, steam generator, purified water pump, one top rack, one bottom rack, two ten pin inserts.
 5. Provide manufacturer's standard side/front trim kit with stainless steel finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify the Construction Manager, and copy to Architect, in writing of any conditions detrimental to the proper and timely completion of the work, and do not proceed with the work until said conditions are corrected.
- B. Verify clearances required for equipment.
- C. Verify ventilation outlets, service connections, and supports are correct and in required location.
- D. Verify that electric power is available and of the correct characteristics.

- E. Beginning of installation means acceptance of existing site conditions.

3.2 INSTALLATION

- A. Install each product in accordance with manufacturers' instructions.
 - 1. Maximum variation for installed equipment, from true position of 1/16 inch in 8 feet for plumb and level and a maximum of 1/32 inch offsets in adjoining surfaces intended to be flush.
- B. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.
- C. Anchor equipment using devices appropriate for equipment, substrate and expected usage.

3.3 ADJUSTING

- A. Adjust equipment to ensure proper working order and conditions.
- B. Remove and replace equipment creating excessive noise, or vibration.
- C. After installation is completed, insure that operating parts work freely and fit neatly. Adjust hardware and catches. Repair or replace damaged parts dents, buckles, abrasions, scraps or other damage affecting the appearance or serviceability.

3.4 CLEANING

- A. Clean Work under provisions of Section 01 73 00 - EXECUTION:
 - 1. Wash and clean equipment.
 - 2. Clean and polish glass, plastic, hardware and accessories, fixtures and fittings.
- B. Remove protective coverings from prefinished work just prior to Owner's acceptance of facility.

End of Section

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Section 11 53 13
LABORATORY FUME HOODS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes laboratory fume hoods, related component fittings, fixtures, and related accessories and trim as required for a fully piped and wired unit ready for attachment to building mechanical, plumbing and electrical systems.
 - 1. ADA compliant demonstration type fume hoods including related accessories and trim.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 11 53 00 - LABORATORY EQUIPMENT.
- E. Section 12 35 53 – LABORATORY CASEWORK: Laboratory casework, epoxy resin tops.
- F. Division 22 - PLUMBING: Connections to all plumbing work furnished under this Section.
- G. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Fume hood vent connections and ductwork (from hood duct collar to hood exhaust system).
- H. Division 26 - ELECTRICAL: All electrical work related to items in this Section

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ADAAG - Accessibility Guidelines for Buildings and Facilities
 - 2. ANSI/ASHRAE Standard 110.2016 - Method of Testing Performance of Laboratory Fume Hoods
 - 3. ASTM D 552 – Bending Test

4. ASTM D 2197 - Standard Method of Test for Adhesion of Organic Coatings.
5. ICC/ANSI A117.1 - Providing Accessibility and Usability for Physically Handicapped People.
6. NSF/ANSI Standard 49 – Photometric Method of Testing.
7. NIH03-112C - National Institute of Health Specification
8. UL 1805 – Underwriters Laboratories Fume Hood Classification
9. NFPA 45 – Standard on Fire Protection for Laboratories Using Chemicals

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
2. Coordinate installation of fume hoods with laboratory casework, fume hood exhaust ducts, and plumbing and electrical work.

B. Pre-Installation Meetings: At least two weeks prior to commencing the work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Owner or designated representative, Architect, Construction Manager, Installer's Project Superintendent, manufacturer's technical representative and representatives of other related trades as directed by the Architect or Construction Manager, and representatives for installers of related work specified under the following Sections:
 - a. Division 22 - PLUMBING.
 - b. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING.
 - c. Division 26 – ELECTRICAL.
2. Agenda:
 - a. Scheduling of operations.
 - b. Review of staging and material storage locations.
 - c. Coordination of work by other trades.
 - d. Installation procedures for ancillary equipment.
 - e. Protection of completed Work.
 - f. Discuss process for manufacturer's inspection and acceptance of completed Work of this Section.

C. Sequencing:

1. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

D. Scheduling:

1. Coordinate schedule of construction, size of access and route to place of installation to prevent delay of installation due to physical impediments. Any work involving the demolition and reconstruction of partitions, walls, floors, roofing, windows, or doors to place and install the work of this Section shall be performed at no additional cost to the Owner.

1.5 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Manufacturer's data for each type of fume hood including service fittings.
2. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
3. Certificates: Provide manufacturer's certification and test data indicating compliance with ASRAE Standard 110-2016 with a performance rating of 4.0 (tracer gas release in liters/minute), AM (as manufactured), 0.01 (level of control of tracer gas in parts per million (ppm)).
4. Shop drawings for fume hoods, showing plan layout, elevations, ends, cross-sections, service run-spaces, location and type of fixtures and service fittings, together with indication of associated service supply connections required.
 - a. Include details and location of anchorages and fitting to floors, walls, and base.
 - b. Include layout of units with relation to surrounding walls, doors, windows, lighting and air-conditioning fixtures, connections of hood-to-hood exhaust system, location of access doors, cut-off valves, junction boxes.
 - c. Coordinate shop drawings with other trades whose work affects installation or performance of fume hood.
 - d. Provide roughing-in drawings for mechanical and electrical services.
5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.6 QUALITY ASSURANCE

- A. Catalog Standards: Manufacturer's catalog numbers may be indicated on drawings for convenience in identifying certain fume hoods. Unless modified by notation on drawings or otherwise specified, manufacturer's current catalog description for

indicated number, together with indicated or specified options or accessories, constitutes requirements for each such unit.

1. Use of catalog numbers and specific requirements indicated on drawings and in specification are not intended to preclude use of equivalent products by other listed acceptable manufacturers, but are given for purpose of establishing a minimum standard of design and quality for materials, construction, workmanship, capacity, and performance of each fume hood.
 - B. General Performance: Design fume hoods so that, when connected to exhaust system that provides proper exhaust volume under normal laboratory conditions, fume hoods will operate in a safe, efficient manner, within acceptable tolerances for face velocities specified. Dead-air pockets and reverse-air currents will not be permitted along surface of hood interiors.
- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Coordinate delivery of fume hoods with delivery of other laboratory casework components.
 - B. Delivery and Storage: Deliver materials under protective cover and store within dry enclosed space. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective covering.
 - C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no change in Contract Sum.
- 1.8 WARRANTY
- A. Provide manufacturer's one-year warranty against all defects in material or workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer and Product: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Kewaunee Scientific Corporation, product: "Supreme Air TruView Teaching Hood".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Kewaunee Scientific Corporation, Statesville, TN.
 - a. Product: "Supreme Air TruView Teaching Hood".
 2. Fisher Hamilton Scientific, Two Rivers, WI.
 - a. Product: "Safeaire Pass-Through Demonstration Assembly".
 3. Labconco Corporation, Kansas City, MO.
 - a. Product: "Protector ClassMate Laboratory Hood".
 4. Mott Manufacturing, Ltd., Brantford, Ontario, CN.
 - a. Product: "Observation Fume Hood".

5. Bedcolab, Ltd., Laval, Quebec, CN.
 - a. Product: "Vision Student Laboratory Fume Hood".

2.2 DESCRIPTION

- A. The hoods shall be of the bypass type. The fume hood design shall allow for automatic air bypass above the sash opening. The bypass shall limit the maximum air velocity through the face of the hood and provide for a constant volume of air through the hood regardless of sash position. The bypass shall control the increase in face velocity as the sash is lowered to limit the maximum velocity to not more than three and one-half, times the velocity with the sash full open.
 1. Fume hoods shall be delivered fully assembled including pre-wired and pre-plumbed ready for connection to building mechanical electrical and plumbing systems.
- B. Regulatory Requirements:
 1. All designs, clearances, construction, workmanship, and material, unless specifically excepted, shall be in accordance with the requirements of:
 - a. Commonwealth of Massachusetts Regulation 521 CMR: Architectural Access Board, as amended.
 - b. NFPA 70 National Electrical Code.
 - c. Work shall be in full conformance with all regulations for the physically handicapped in accordance with ANSI Publication No. A-117.1 Part 4, Series 4.12, Design of Barrier-Free Facilities, the recommendations of United States Department of Justice, N° 28 CFR Part 36 - American with Disabilities Act Public Law 101-336, (referred to herein as "ADA"), local authorities, and all other governing bodies which may have jurisdiction.
 - d. Products requiring electrical connection: Listed and classified by Underwriter's Laboratories, Inc., as suitable for the purpose specified and indicated.

2.3 PERFORMANCE/DESIGN CRITERIA

- A. Fume hoods shall be of complete airfoil design to insure maximum operating efficiency. Foil sections at the front fascia of the hood shall minimize eddying of air currents at the hood face and the rear baffle system shall minimize turbulence in the upper portion of the hood interior.

2.4 MATERIALS

- A. Exterior Metal: Manufacturer's standard with acid-resistant and alkali-resistant, baked-on finish. Provide in color as selected by Architect from manufacturer's standard range of available colors.
- B. Stainless Steel: AISI Type 302/304 with No. 4 finish.
- C. Tempered Safety Glass: Comply with ASTM C 1048 FT, fully tempered, Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1.

2.5 FABRICATION

- A. General: Design hoods to be highly fume resistant, to collect, retain and dispose of hazardous fumes with complete safety, minimum purging of air from room supply, and minimum turbulence within hood chamber.
- B. Provide airfoil vane at bottom to match configuration of side sections. Mount foil with 1-inch open space between foil and bottom front edge of hood superstructure to prevent backflow of air and to direct positive flow of air across work surface. Extend airfoil under sash line, so that sash closes on top of foil.
- C. Superstructure Framework: Freestanding heavy gage steel members, reinforced, braced and assembled to insure strength and rigidity and to support exterior panels, interior liner, and baffle panels.
 - 1. Superstructure shall allow for exterior and interior liner panels to be removable without disassembly of the frame structure or adjacent panel assemblies.
- D. Body Construction: Fabricate exterior of minimum 18-gage cold-rolled steel with component parts screwed together to allow removal of end panels, front-end fascia pieces, top fascia and airfoil strips, and to allow access to plumbing lines and service fittings. Apply manufacturer's standard acid- and alkali-resistant, baked-on finish to interior and exterior surface of component parts prior to final assembly.
- E. Interior walls: Double-wall end panels without projecting corner posts or other obstructions to interfere with smooth, even flow of air. Close area between double walls for housing sash counter-balance weights, utility lines, and remote-control valves. Fascia section shall have a full 135 degree 1 inch radius at the front leading edge or equivalent configuration to provide a streamlined section and insure smooth even flow of air into the hood. Vertical fascia shall contain the required service controls, electrical switches and receptacles. The hood interior end panels and sash track shall be flush with the fascia to prevent eddy currents and back flow of air.
 - 1. Provide fully finished rear panel in all fume hoods
- F. Airfoil: Streamlined, removable, airfoil fabricated from 16 gage steel integral to the bottom of hood opening providing a nominal 1 inch open space between the foil and the top front edge of the work surface to direct an air stream across the work surface to prevent back flow of air. The airfoil shall extend back under sash, to prevent sash from closing opening. Airfoil shall be removable to allow large equipment into the hood.
- G. Fume hood top panel: Manufacturer's standard grille bypass configuration. Top front panel shall be of the same material as the exterior fascia.
 - 1. Provide ceiling enclosure panel matching construction and finish of superstructure; scribed to ceiling.
- H. Fume hood lighting: UL listed one-tube, energy-efficient, providing minimum illumination at 13 inches above the work surface of 100 foot-candles.
- I. Fume hood sash: Vertical rising sash of 1/5 inch tempered safety glass in a single slotted sash track. Sash track shall be a neutral colored epoxy coated steel set flush with interior liner panels to minimize turbulence

1. Counterbalance vertical sliding sash with sash weight and cable system. Provide nylon coated steel cable, ball-bearing sheaves, plastic glides in stainless steel guides, and stainless steel lift handles. Provide rubber bumpers at top and bottom of each sash unit.
 2. Provide manufacturer's standard safety label on sash.
 3. Provide manufacturer's factory installed sash locks at all fume hoods.
- J. Fume hood lining: Use tempered glass for exposed interior surfaces. Use stainless steel for fasteners and other exposed metal. Furnish end panels, back panel, and top of not less than 1/4-inch-thick material, screwed together with cleats or steel angles to form a completely rigid assembly to which exterior cold-rolled steel panels are mounted.
1. Back up joints with angles or cleats and coat joints with chemical-resistant mastic before assembly to prevent open joints or spaces. Use stainless steel truss-head screws or rivets (not countersunk) for assembly of panels and to provide maximum strength joints. Secure hood baffle to cleats at side of hood with stainless steel screws.
 2. Punch hood side panels to receive remote controls and service fittings at side of hood, as indicated. Furnish removable plug buttons for holes not used for indicated fittings.
 3. Liner Panel Performance Tests: Chemical Spot Tests at 24 Hours:
 - a. Chemical spot test shall be made by applying 10 drops (approximately 1/2 cc) of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/2 inch diameter watch glass, convex side down to confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1-inch or larger ball of cotton shall be saturated with the solvent and placed on the surfaces to be tested. The cotton ball shall then be covered by an inverted 2-ounce, wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire 24-hour test period and at a temperature of 77 degrees F. + 3 degrees F.
 - b. At the end of the test period, the reagents shall be flushed from the surfaces with water and the surface scrubbed with a soft bristle brush under running water, rinsed, and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Spots where dyes have dried shall be cleaned with a cotton swab soaked in alcohol to remove the surface dye. The test panel shall then be evaluated immediately after drying.
 - c. Ratings/Legend:

Modified Epoxy Resin	A = No effect or slight change in gloss
	B = Slight change in gloss or color
	C = Slight etching or severe staining
	D = Swelling, pitting, or severe etching
 - d. RESULTS:

Acetic Acid	98%	A
Acetone	**	A
Acid Dichromate		A
Ammonium Hydroxide	** 28%	A

Amyl Acetate **		A
Benzene **		A
Butyl Alcohol **		A
Carbon Tetrachloride **		A
Chloroform **		A
Chromic Acid	60%	B
Cresol		A
Dichloroacetic Acid		A
Dimethylformamide		A
Dioxane **		A
Ethyl Acetate **		A
Ethyl Ether **		A
Ethyl Alcohol **		A
Formaldehyde		A
Formic Acid	90%	A
Furfural **		B
Gasoline **		A
Hydrochloric Acid	37%	A
Hydrofluoric Acid	48%	B
Hydrogen Peroxide	30%	A
Methyl Ethyl Ketone **		A
Methyl Alcohol **		A
Methylene Chloride **		A
Monochlorobenzene **		A
Naphthalene **		A
Nitric Acid	20%	B
Nitric Acid	30%	B
Nitric Acid	70%	B
Phenol **	85%	A
Phosphoric Acid	85%	A
Silver Nitrate		B
Sodium Hydroxide	40%	A
Sodium Hydroxide	20%	A
Sodium Hydroxide	10%	A
Sodium Hydroxide Flake		A
Sodium Sulfide		A
Sulfuric Acid	77%	A
Sulfuric Acid	96%	C
Sulfuric Acid	33%	A
Tincture of Iodine		A
Toluene **		A
Trichlorethylene **		A
Xylene **		A
Zinc Chloride		A
Nitric 70%/Sulfuric Acid	77%*	B

- * Equal parts of Nitric Acid 70% and Sulfuric Acid 77%.
- ** Indicates these solvents tested with cotton and jar method

- K. Working Surface: Minimum 1 inch-thick molded epoxy resin working surface with marine edge to form a watertight pan not less than 3/8 inch deep. Provide manufacturer's standard epoxy resin cup drain flush with recessed work surface.
- L. Baffle: Provide a removable baffle at rear of hood with adjustable openings. Fabricate unit to be easily removable for cleaning behind baffle, of same material as hood lining.
 - 1. Adjustable baffles will not be permitted.
- M. Plenum Chamber: Adequate volume for hood dimensions, extending full width of hoods to equalize incoming airflow, of same material as hood lining. Provide corrosion-resistant, duct stub of proper dimension for connection to exhaust duct assembly.
- N. By-Pass Areas: When air is required to be taken from room other than through hood sash opening, provide suitable by-pass areas having the required free opening but concealing plenum behind.
- O. Electrical: Fume hood electricals shall be field wired by others. Electrical outlets and switches shall be located on base cabinets. Duplex receptacles shall be 20 amp, 125 volt, AC and 3-wire polarized grounded with ground fault interruption. Receptacles shall be specification grade side wired only to ensure positive connection. Light switches shall be 20 amp, 125 volt, AC and 3-wire polarized grounded. Field wiring shall terminate in one 4 inch by 4 inch service junction box located on fume hood roof.
- P. Plumbing: Plumbing fit out shall consist of remote control valves located within the end panels, controlled by extension rods projecting through the control panels of the hood, with color coded plastic handles. Interior fitting for gases and water shall be nylon panel flanges and angle serrated hose connectors, color-coded. Interior fittings for distilled water shall consist of a bronze tin lined, white color-coded, panel flange and angle serrated hose connector. Water goosenecks shall be epoxy coated brass with a chemical resistant metallic bronze finish. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Inlet piping shall have a single-point connection for each valve provided and carried to a point 1 inch above the fume hood roof or 1 inch above the worktop rear corner depending on the rough-in locations shown in the drawings. Points of final service connection by other trades shall be at the stub provided by the fume hood manufacturer.
- Q. Fume hood alarm system: Fume hoods shall be provided with an electronic alarm system to detect low hood face velocities. The alarm system shall sense the actual face velocity of the hood regardless of sash position. The system shall have air velocity sensing thermistor located in the monitor on the face of the hood. The monitor shall have a green light activated when the face velocity is above the set point and a red light and audible alarm that are activated when the face velocity is below the set point. The audible alarm can be acknowledged and silences with mute switch on panel. When the mute is activated, it automatically resets itself when face velocity again rises above calibrated set point. The set point is to be

factory set and calibrated at approximately 70 FPM. Field calibration is required. Air flow is shown as a multi-light display column or as LED digital display.

- R. Closure Strips: Metal to match adjoining surfaces and ceilings at fronts and sides of fume hoods. Provide where required to close openings between fume hood base cabinet and superstructure and adjacent building wall construction.
- S. Holes: Provide holes for passage of piping and conduit and for fittings furnished under other Division 12 Sections.
- T. Fasteners: Provide stainless steel fasteners wherever exposed to fumes in hood.

2.6 FINISHES

- A. Assembled fume hood components shall be given a pre-paint treatment for adhesion of the final finish system and to aid in the prevention of corrosion due to humidity or presence of chemicals. Physical and chemical cleaning of the steel shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a complex metallic phosphate solution to provide a uniform fine-grained crystalline phosphate surface.
- B. After pre-paint treatment has fully cured provide all steel surfaces with a chemical and corrosion resistant, environmentally friendly, electrostatically applied powder coat finish. All components shall be individually painted, insuring that no area be vulnerable to corrosion due to lack of paint coverage. The coating shall then be cured by baking at elevated temperatures to provide maximum properties of corrosion and wear resistance.

2.7 FINISH PERFORMANCE TESTING:

- A. Chemical spot tests for non-volatile chemicals shall be made by applying 5 drops of each reagent to the surface to be tested and covering with a 1-1/4 inch diameter watch glass, convex side down to confine the reagent. Spot tests of volatile chemicals shall be tested by placing a cotton ball saturated with reagent on the surface to be tested and covering with an inverted 2 ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of $77^{\circ} \pm 3^{\circ}$ F. For both methods, leave the reagents on the panel for a period of one hour. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.
- B. Test results:
 - 1. Level 0 - No detectable change.
 - 2. Level 1 - Slight change in color or gloss.
 - 3. Level 2 - Slight surface etching or severe staining.
 - 4. Level 3 - Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

- C. Test results: After testing, panel shall show no more than three (3) Level 3 conditions.
- D. Test Reagents (Where concentrations are indicated, percentages are by weight):

Chemical Reagent	Test Method
Acetate, Amyl	Cotton ball & bottle
Acetate, Ethyl	Cotton ball & bottle
Acetic Acid, 98%	Watch glass
Acetone	Cotton ball & bottle
Acid Dichromate, 5%	Watch glass
Alcohol, Butyl	Cotton ball & bottle
Alcohol, Ethyl	Cotton ball & bottle
Alcohol, Methyl	Cotton ball & bottle
Ammonium Hydroxide, 28%	Watch glass
Benzene	Cotton ball & bottle
Carbon Tetrachloride	Cotton ball & bottle
Chloroform	Cotton ball & bottle
Chromic Acid, 60%	Watch glass
Cresol	Cotton ball & bottle
Dichlor Acetic Acid	Cotton ball & bottle
Dimethylformamide	Cotton ball & bottle
Dioxane	Cotton ball & bottle
Ethyl Ether	Cotton ball & bottle
Formaldehyde, 37%	Cotton ball & bottle
Formic Acid, 90%	Watch glass
Furfural	Cotton ball & bottle
Gasoline	Cotton ball & bottle
Hydrochloric Acid, 37%	Watch glass
Hydrofluoric Acid, 48%	Watch glass
Hydrogen Peroxide, 3%	Watch glass
Iodine, Tincture of	Watch glass
Methyl Ethyl Ketone	Cotton ball & bottle
Methylene Chloride	Cotton ball & bottle
Mono Chlorobenzene	Cotton ball & bottle
Naphthalene	Cotton ball & bottle
Nitric Acid, 20%	Watch glass
Nitric Acid, 30%	Watch glass
Nitric Acid, 70%	Watch glass
Phenol, 90%	Cotton ball & bottle
Phosphoric Acid, 85%	Watch glass
Silver Nitrate, Saturated	Watch glass
Sodium Hydroxide, 10%	Watch glass
Sodium Hydroxide, 20%	Watch glass
Sodium Hydroxide, 40%	Watch glass
Sodium Hydroxide, Flake	Watch glass
Sodium Sulfide, Saturated	Watch glass

Sulfuric Acid, 33%	Watch glass
Sulfuric Acid, 77%	Watch glass
Sulfuric Acid, 96%	Watch glass
Sulfuric Acid, 77% and Nitric Acid, 70%, equal parts	Watch glass
Toluene	Cotton ball & bottle
Trichloroethylene	Cotton ball & bottle
Xylene	Cotton ball & bottle
Zinc Chloride, Saturated	Watch glass

- E. Performance Test Results (Heat Resistance):
1. Hot water (190° F - 205° F) shall be allowed to trickle (with a steady stream at a rate not less than 6 ounces per minute) on the finished surface, which shall be set at an angle of 45° from horizontal, for a period of five minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.
- F. Performance Test Results (Impact Resistance):
1. A one-pound ball (approximately 2 inches diameter) shall be dropped from a distance of 12 inches onto the finished surface of steel panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close eye ball examination.
- G. Performance Test Results (Bending Test):
1. An 18 gauge steel strip, finished as specified, when bent 180° over a 1/2" diameter mandrel, shall show no peeling or flaking off of the finish.
- H. Performance Test Results (Adhesion):
1. Ninety or more squares of the test sample shall remain coated after the scratch adhesion test. Two sets of eleven parallel lines 1/16 inch apart shall be cut with a razor blade to intersect at right angle thus forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush. Examine under 100 foot-candles of illumination.
- I. Performance Test Results (Hardness):
1. The test sample shall have a hardness of 4H using the pencil hardness test.
 2. The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel like manner until one is found that will cut or scratch the film. The pencil used before that one that is, the hardest pencil that will not rupture the film is then used to express or designate the hardness.

2.8 ACCESSORIES

- A. Service Fittings: Manufacturer's standard heavy-duty, chrome plated finish over brass. Type, configuration and location of fittings are shown on Drawings.
- B. Airflow Alarm: Provide fume hoods with audible and visual alarm that activates when airflow sensor reading is outside of preset range.

1. Provide with either thermal-anemometer or aneroid gage airflow sensor.
 2. Provide with reset and test switches.
 3. Provide with switch that silences audible alarm and automatically resets when airflow returns to within preset range.
- C. Sash Alarm: Provide fume hoods with audible and visual alarm that activates when sash is opened beyond preset position.
1. Provide with silence and test switches.
- D. Sash Stops: Provide fume hoods with sash stops to limit hood opening to 50 percent of sash height. Sash stops can be manually released to open sash fully for cleaning hood and for placing large apparatus within hood.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install fume hoods plumb, level, aligned, rigid, and securely anchored to building and adjacent laboratory casework, in proper location, in accordance with manufacturer's instructions and approved shop (layout) drawings. Install closures neatly. Securely attach access panels, but provide for easy removal and secure reattachment.
- B. Coordinate sequence of work with mechanical and electrical trades and with related work such as laboratory casework specified in Section 12 30 00 – CASEWORK.

3.2 FIELD QUALITY CONTROL

- A. Field Test: Field test each unit after completion of installation to verify proper operation of hoods.
- B. Field test hoods according to fume hood standard after completing installation to demonstrate proper operation. Also test one hood selected by Architect, for each type of hood installed, according to ASHRAE 110 to verify performance. If any hood tested for performance fails to perform as specified, field test additional hoods as directed by Architect.
1. Adjust fume hoods, hood exhaust fans, and building's HVAC system, or replace hoods and make other corrections until tested hoods perform as specified.
 2. After making corrections, retest fume hoods that failed to perform as specified.

3.3 ADJUST AND CLEAN

- A. Moving Parts: Carefully check and adjust moving parts to insure smooth, near-silent, and accurate sash operation with one hand and with uniform contact of rubber bumpers. Ensure counter-balances operate without interference.
- B. Clean surfaces including both sides of glass.
- C. Damaged Work: Repair equal to new undamaged work, or replace with new units, as acceptable to Architect.

End of Section

Section 11 66 23
GYMNASIUM EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Volleyball equipment.
 - 2. Badminton equipment.
 - 3. Protective wall padding.
 - 4. Volleyball storage/transport system.
 - 5. Ceiling suspended batting cage.
 - 6. Portable game standards.
- B. Furnish the following products to be installed under the designated Sections:
 - 1. Volleyball sleeves to be installed under Section 05 50 00 – METAL FABRICATIONS.
- C. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 43 39 - MOCKUPS: Requirements for mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking.

- G. Section 09 64 66 - WOOD ATHLETIC FLOORING: Furnishing and installing volleyball sleeves and standards, (uprights).
- H. Division 26 - ELECTRICAL: Electrical connections.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets for wall padding and volleyball system.
 - 2. Manufacturer's installation instructions.
 - 3. Manufacturer's certificates: Certify that Products provided under this Section meet or exceed UL and specified requirements.
 - 4. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 - 5. Shop drawings: Installation details showing mounting conditions, clearances, dimensions.
 - 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Porter Athletic Equipment Company, Schiller Park, IL as specified herein below.
- B. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Porter Athletic Equipment Company, Schiller Park, IL.
 - 2. Draper Shade and Screen Company, Spiceland, IN.
 - 3. Institutional Products, Inc., Indianapolis, IN.
 - 4. Performance Sports Systems, Anderson, IN.
 - 5. AALCO Manufacturing Company, Louis, MI.

- C. Sole Source: Manufacturer for the work of this Section shall be same as providing basketball gym equipment specified under Section 11 66 24.

2.2 VOLLEYBALL EQUIPMENT

- A. Volleyball sleeve: 3-3/4 inch outside diameter, heavy-wall steel tubing modified for height and welded to floor beam. Top of sleeve to be installed 1/2 inch below finished floor elevation. Cover plate shall consist of an 8" O.D. recessed collar, cork gasket and chrome-plated cover. A swivel retainer pin in the collar shall permit cover to swivel and prevent theft. Provide special cover removal key.
 - 1. Locations and quantities as shown on Drawings.
 - 2. Basis of design product: Porter No. 00872-200 floor sleeve system.
- B. Volleyball standards: 3-1/2 inch outside diameter, high-strength, lightweight aluminum alloy (6063T6), designed with two internal reinforcing ribs for maximum rigidity and minimum deflection. Post shall be finished with a durable clear anodized finish. Volleyball upright shall be equipped with special sliding collar devices incorporating a spring-loaded pin to guide height setting collar up and down the standard without rotating. Special collar shall allow volleyball standard to be infinitely height adjustable for instant net height settings for volleyball, badminton and tennis. Standards shall include height-marking labels. Standards shall comply with USAV, NCAA, NFSHSA and NAGWS requirements
 - 1. Basis of design product: Porter No. 19610XX "International Package" volleyball standards.
 - 2. Standards shall be equipped with tensioning winch self-locking ratchet mechanism with a compression disc-brake type release mechanism to eliminate the danger of suddenly released cable tension when removing a net. Winch shall be furnished with a 1-3/4 inch wide high-tensile nylon strap and durable snap hook and a removable handle to prevent unauthorized use.
 - a. Basis of design product: Porter "Powr Winch".
- C. Volleyball net: 32 feet by 39 inches with a 37 foot 6 inch top cable. The end hems shall be 6 inches wide to allow for durability and strength. Each end hem shall be equipped with three 1 inch wide polypropylene tensioning straps and 1/2 inch fiberglass dowels.
 - 1. Basis of design product: Porter No. 19610XX "International Package".
 - 2. Provide each net with set of net antenna with clamp. Net antenna shall incorporate the antenna clamps as one complete unit and shall secure easily and without the aid of a chair or stepladder. Net antenna shall be 3/8 inch by 6 foot long fiberglass dowels. Antenna shall be alternately marked red and white.
 - a. Basis of design product: Porter No. 2254000 (provide three full net assemblies).

2.3 BADMINTON NETS

- A. Badminton net: 20 feet by 30 inches with tie-off cords of sufficient length to allow net attachment to volleyball standards. Provide top and end hems constructed of heavy white vinyl with grommets at ends to allow for tie-off cord attachment. Nets shall be fabricated from No. 6 black cotton thread in a 1 inch mesh meeting all standards for competition.

1. Basis of design product: Porter No. "2236110" (provide three full net assemblies)..

2.4 ROLLAWAY GAME STANDARDS

A. Rollaway game standards:

1. Uprights: Fabricated from 1.90 inch OD heavy wall tubing with drill holes for volleyball and badminton nets and optional reel attachment. Provide uprights with eyebolts and nuts for use as end or center standards. Provide powder coat finish in color selected by the Architect from the manufacturer's full range of available colors.
2. Base: Fabricated from 24 inch diameter steel dome encased along its perimeter with an endless black rubber non-marking protection ring and two 3 inch diameter non-marking casters and a 2-3/8 inch OD high strength tube for upright attachment.
3. Basis of design product: Porter No. "00431-000" (provide pairs of rollaway game standard assemblies).

2.5 PROTECTIVE WALL PADDING

A. Wall padding: Prefabricated wall-mounted panels, (Standard Pad, L Pad or C Pad) equal to Porter No. 00956-100 "Gymnasium Wall Pad (no margin)", in compliance with Class A flame spread and smoke in accordance with ASTM E84, and impact resistance in accordance with ASTM F 2440 and the following requirements:

1. Size: Widths from 2 to 12 feet as indicated on the Drawings by 6 feet 8 inches in total height, with cutouts made in field to fit job conditions.
2. Thickness: Manufacturer's standard 2 inches as applicable to referenced products.
3. Flame resistant in accordance with NFPA 701 and California State Fire Code F-230.
4. Class A rated in accordance with requirements of NFPA-101.
5. Covering: Flame-retardant 19-ounce non-tear vinyl laminated material, mildew and rot resistant, fungicide treated, with 100 psi tear resistance color to be selected by Architect from manufacturer's full range of options.
6. Surface: Leather grain embossed pattern.
7. Backing: 7/16 inch thick oriented strand board.
8. Mounting: Z clips top, center and bottom.
9. Locations and quantities as shown on drawings.

B. Molded inserts: Single and double gang flame-retardant rubber molded inserts, equal to Porter "90343001". Color: As selected by the Architect from the manufacturer's full range of available colors.

1. Coordinate insert sizes with Electrical Drawings.
2. Openings larger than a quadruplex outlet. Wall pad to be custom cut around other device, with the pad finish to return on all sides back to the wall. On the exposed wall area around the device would be the same padding material so to blend in.

2.6 VOLLEYBALL STORAGE/TRANSPORT SYSTEM

- A. Volleyball Storage/Transport system: Heavy-duty steel transport frame designed to store and transport six sleeve-type volleyball standards, one judge's stand with pads, three nets including antennae and three sets of upright pads. Frame to be constructed of heavy wall 2-½ inch by 1-½ inch rectangular steel tubing. Heavy formed steel hooks shall be provided on side diagonal frame members for storage of standards. Hooks shall be covered in a vinyl material to protect finish on upright posts. Large vinyl nylon net storage pouch shall be provided with tunnel loops and velcro flaps for attaching to transport frame. Bottom of transport shall be equipped with a 20 inch by 48 inch vinyl covered storage shelf for upright pads. Entire unit to roll on four 3-1/2 inch diameter heavy-duty swivel casters. Overall size of unit to be 4 feet 3/8 inch in length, 3 feet 2-1/4 inch in height and 2 feet 6-1/4 inch in width to allow transporter to pass through a typical 3 foot wide doorway.
- a. Basis of design product: Porter No. 00956-100.

2.7 BATTING CAGE

- A. Batting cage: Ceiling suspended, metal framed batting cage equal to Porter No. 90920-000 meeting the following requirements:
1. Size 12 feet by 12 feet by 70 feet.
 2. Framing: 1-7/8 inch OD heavy wall electroplated tubing with cross spreaders at 14 foot centers for cable attachment and tee fittings at all junctions.
 3. Cabling: 1/8 inch diameter galvanized vandalproof cable with a minimum breaking strength of 2,100 pounds.
 4. Motor: 1 horsepower with manufacturer's standard audible alarm; with Porter No. 12002-250 "Sportsonic II Receiver.
 5. Netting: 1 inch square knotless nylon mesh netting.
- B. Remote controller: Equal to Porter No. 12002-100 complying with the following:
1. Quantity: One (1).
 2. Range: 100 feet minimum.
 3. Operation: Capable of controlling up to 99 devices.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of project conditions.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.
- D. Inspect prefabricated padding prior to installation.

3.2 INSTALLATION

- A. Install padding in accordance with manufacturer's instructions for each type.
 - 1. Fasten pads to wall level and plumb; shim to keep panels flat. Apply sealant to all z-clips. Sealant shall be one-part medium modulus, natural cure, synthetic sealant.

3.3 PROTECTION

- A. Protect pad covering materials and finished metal surfaces on volleyball system from damage during fabrication, shipping, storage, and erection; advise the Contractor of protective treatment and other precautions required through the remainder of construction.

End of Section

Section 11 66 24
BASKETBALL GYM EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
 - 1. Motorized backstops, control devices, backboards and goals.
 - 2. Control devices to operate backstops and height adjustment and gymnasium divider.
 - 3. Supporting channels and suspension rods required to support work of this section from building structure.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 05 12 00 - STRUCTURAL STEEL: Structural steel.
- F. Section 11 66 43 - SCOREBOARDS: Shot clock mounted to backstops.
- G. Division 26 - ELECTRICAL: Electrical power and connections for equipment.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets for backstop, including mounting system, backboard, goal and netting.

2. Manufacturer's installation instructions.
3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
4. Shop drawings: Installation details showing mounting conditions, clearances, dimensions.
5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.4 WARRANTIES

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Provide manufacturer's 10 year warranty year for backboard and 5 year warranty for winches. Warranties are in addition to and not in lieu of, other liabilities which the Construction Manager may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Porter Athletic Equipment Company, Schiller Park, IL.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 1. Porter Athletic Equipment Company, Schiller Park, IL.
 2. Draper, Inc., Spiceland, IN.
 3. AALCO Manufacturing Company, St. Louis, MI.
- C. Sole Source: Manufacturer for the work of this Section shall be same as providing gymnasium divider curtains specified under Section 11 66 53.

2.2 BASKETBALL BACKSTOPS

- A. Backstops, (2) at Main Court, (4) at Side Courts and (2) at Synthetic Floor Court: Forward folding, adjustable ceiling-mounted backstops, each with single mast drop

frame, equal to Porter No. 949 "Center Strut", electrically operated, shall conform to latest NCAA and NFSA recommendations and be in compliance with the following requirements.

1. Support framing: ASTM A513 steel tubing, 6-5/8 inch diameter single mast with 2-1/2 inch by 1-1/2 inch rectangular steel tube diagonal sway bracing.
 - a. Provide main mast with offset pivot for positive locking position.
 - b. Fully welded frame components, full surface welds, tack welding is not acceptable.
 - c. Unit dimensions:
 - 1) Bottom of structure above finished floor: 28 feet 0 inches.
 - 2) Mast centers: 5 feet 6 inches.
 - 3) Front brace dimension (within 6" +/-): 6 feet 9 inches.
 - 4) Horizontal fold dimension: 11 feet 0 inches.
2. Lifting cable; 1/4 inch diameter galvanized aircraft cable, having not less than 7,000 pound breaking strength.
3. Fittings: Malleable iron castings and heavy gage steel stampings
4. Frame finish: Shop primed and gloss powder coat finish in color selected by the Architect.
5. Winch: Electric One (1) horsepower worm gear-type winch with heavy formed steel main frame, equal to Porter No. 713 with Porter No. 12002-250 "Sportsonic II" receiver for each winch.
 - a. Remote controller: Equal to Porter No. 12002-100 complying with the following:
 - 1) Quantity: Three (3).
 - 2) Range: 100 feet minimum.
 - 3) Operation: Capable of controlling up to 99 devices.
6. Audible motion alarm: At each backstop provide a motion alarm to generate an intermittent pulse audible tone when backstop winch is activated. Enclosure shall have a NEMA L14-20 4 pole twist lock type receptacle, a 110 volt 80dB piezo pulse alarm module and a 6 foot long SJO cord with prewired NEMA 14-20 4 pole twist lock type plug equal to Porter No. 12005-100.
7. Mounting brackets for 3-1/2 inch outer diameter pipe.
8. Safety locking strap: Provide folding basketball backstops with safety belt and lock system tested to withstand 1,000 pounds (454 kg) free fall load. Safety lock shall be inertia sensitive to automatically lock backstop in position at any time during storage, raising or lowering. Sudden increases in either tension or speed shall activate lock. Safety belt shall be 2 inch (51 mm) wide nylon belt rated at 6,000 pound (2721 kg) breaking strength. Belt shall extend 35 feet (10.7 m) and shall be automatically retracted and stored on a reel equipped with constant force spring. Operation and locking action shall be activated by centrifugal force to lock backstop before unit travels 12 feet (3.7 m) of free fall and shall incorporate and automatic reset without the use of poles, ropes, levers or other devices.

2.3 BACKBOARDS AND GOALS

- A. Backboard: Steel frame, aluminum faced, rectangular glass backboard, Official size 72 by 42 inches, equal to Porter "Pro-Strut" model N°. 00208-000.

1. Glass: 1/2 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1.
 2. Border and target markings: Fired vitreous white enamel
- B. Goal: Movable rim goal equal to Porter 236154 Power-Flex-II-Goal, conforming to NCAA and NFSHSA specifications for movable rims. High quality enamel finish, furnish with nylon net.
1. Provide direct goal attachment to framing to transfer goal stress to mast pipe.
 2. Backboard Safety padding: 2 inch thick backboard safety padding equal to Porter No. 00326-000, conforming to NCAA specifications, of length to turn up 15 inches on each side of backboard and bolted in place. Glued applications will not be permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine work in place on which specified work is in any way dependent to ensure that conditions are satisfactory for installation of specified work. Report in writing to the Construction Manager and the Architect any defects which may influence competition of specified work. Absence of such notification will be construed as acceptance of work in place. Do not attempt installation until correct conditions are present or you have a written order to do so.

3.2 INSTALLATION

- A. Install basketball backstops in accordance with manufacturer's instructions. Secure units level and plumb.
- B. Adjust each unit for operating positions, accurately establish lowered position in place.

3.3 ADJUSTING, CLEANING AND PROTECTION

- A. Adjust operating parts and hardware to work easily, smoothly, and correctly without warping or binding.
- B. Repair minor damage to eliminate evidence of repair. Remove and replace work which cannot be satisfactorily repaired.
- C. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully cleaned.
- D. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and re-clean as necessary immediately before final acceptance.
- E. Training:
1. Installer shall demonstrate proper operation and maintenance procedures to owner's representative.
 2. Operating keys and owners manuals shall be provided to owner's representative.

End of Section

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Section 11 66 43
SCOREBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install:
 - 1. Remotely controlled wireless interior and exterior electronic scoreboards
 - 2. Shot clocks.
 - 3. All hangers, supports, and fastenings, required for equipment and materials provided necessary for proper and complete operating system.
 - 4. Trim, enclosures and accessories required to make a complete installation.
 - 5. Cage protectors for scoreboards and shot clock.

- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.

- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.

- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.

- E. Section 05 50 00 – METAL FABRICATIONS: Steel posts for mounting exterior scoreboards.

- F. Division 26 - ELECTRICAL: General provisions and execution for all electrical work and the following:
 - 1. Raceway systems.
 - 2. Power wiring and grounding system.

3. Power wiring.
4. Wiring devices.
5. Panelboards, circuit breakers, disconnects, and relays.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data, and installation instructions for each item furnished, including but not limited to:
 - a. Console panel.
 - b. Timer control.
 - c. Scoreboard panel.
 - d. Time panel.
 - e. Lighting elements in panels
 2. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 3. Shop drawings:
 - a. Large scale elevations of scoreboard.
 - b. Large scale design details showing attachment clips and brackets; and complete installation details.
 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
1. Manufacturer's warranties: Include coverage of materials and installation.
 2. Complete set of operating and maintenance instructions.
 3. Wiring diagrams for all components.

1.4 QUALIFICATIONS

- A. Manufacturer, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

1.6 WARRANTY

- A. Provide 5 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include all electronic components, excluding lamps.

1.7 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance which shall include assortment of spare lamps (minimum 24 lamps) and fuses.
- B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Daktronics, Inc., Brookings, SD.
 - 2. Electro-Mech Scoreboard Co., Wrightsville, GA.
 - 3. Varsity Scoreboards, Murray, KY.

2.2 SCOREBOARDS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the following:
 - 1. Type 1 scoreboard: (4 feet by 8 feet by 6 inches) (h x w x d): Daktronics "BB-2101" (1 at synthetic floor Gymnasium).
 - 2. Type 2 scoreboard: (6 feet by 8 feet by 6 inches) (h x w x d): Daktronics "BB-2103" (2) at wood floor Gymnasium).
 - 3. Type 3 scoreboard: (10 feet by 25 feet by 8 inches) (h x w x d): Daktronics "MS-2009" (1 at exterior synthetic turf field).
 - 4. Type 4 scoreboard: (5 feet by 14 feet by 8 inches) (h x w x d): Daktronics "MS-918" (1 at Lower Field).
- B. Interior Scoreboards:

1. General: Provide sizes indicated, with an aspect ratio of 1:2 for width to length dimensions, wireless, 100 percent solid state, single sided scoreboards displaying the following information.
 - a. Automatic second by second display of time remaining or time elapsed in minutes and seconds for periods up to 99 minutes or less. Metric clock shows tenths of a second and seconds during last minute.
 - b. Period number 0 through 9.
 - c. Bonus arrows.
 - d. Team scores 0 through 199.
 - e. Team fouls 0 through 99.
 - f. Uniform number 0 through 99.
 - g. Volley ball and wrestling options.
 - h. Next possession indicators.
 - i. Vibrating horn.
 - j. Gloss white enameled captions: "HOME" and "VISITOR" are applied 6 inch vinyl lettering.
 - k. Gloss white enameled caption: "PERIOD" is applied 4 inch vinyl lettering.
 - l. Operator's wireless master console with running time display, and carrying case.

C. Exterior Scoreboards:

1. General: Provide sizes indicated, with an aspect ratio of 1:2 for width to length dimensions, wireless, 100 percent solid state, single sided scoreboards displaying the following information.
 - a. Single-sided multisport scoreboard displays period time to 99:59, HOME and GUEST scores to 99, PERIOD to nine, PLAYER number to 99 and PENALTY time to 9:59 for two players on both teams, and indicates team penalty. During the last minute of the period, the clock displays time to 1/10 of a second.
2. Construction:
 - a. Aluminum alloy Type 5052.
 - b. Scoreboard back, face, and perimeter: 0.063 inch (1.60 mm) thick.
 - c. Scoreboard top and bottom: 0.125 inch (3.18 mm) thick.
3. Digits:
 - a. LED.
 - 1) Color: White.
 - b. HOME, GUEST, and clock digits: 24 inches (610 mm) high.
 - c. PERIOD, PLAYER, and PENALTY digits: 18 inches (457 mm) high.
 - d. Seven bar segments per digit.
 - e. PanaView® LED digit technology.
 - f. All digits are sealed front and back with weather-tight silicone gel.
4. Captions:
 - a. Vinyl applied directly to scoreboard face.

- b. HOME and GUEST captions: 15 inches (381 mm) high.
 - c. PERIOD, 1, and 2 captions: 10 inches (254 mm) high.
 - d. PLAYER and PENALTY captions: 9 inches (229 mm) high.
 - e. Color: Standard white.
- D. Display modules LED digit technology 13 inches high for minute and second, 10 inches high for period, 4 inches high for bonus and 3 inches for possession arrows. Clock, colon and period digits and bonus indicators are amber LED, Score digits and possession indicators are red LED. Seven bar segments per digit. Attach scoreboard, to adjacent wall surface as indicated on the Drawings or as otherwise directed by the Architect.
- E. Scoreboard housing: Completely enclosed, all aluminum construction, minimum 0.063 inch thick for face and perimeter and 0.050 inch thick for back. Cabinet shall be designed in manner to permit service access from front of the housing without the use of special tools.
1. Finish: Exposed exterior surfaces shall be immersion etched and finished in in custom colors with gloss white captions and trim.
 - a. Colors as selected by the Architect.
 2. School name, South High Community School, to be applied on board with a minimum of 3 inch vinyl lettering with format as selected by the Architect.
 3. Accessories: Provide with all necessary fasteners and brackets for wall mounting.
- F. Control console (wood floor Gymnasium [2] and exterior synthetic turf field): Provide for all scoreboards a table mounted console with a control-display panel in a cast aluminum housing having epoxy thermal-set enamel finish. Panel shall be interchangeable between football, basketball and other sports and have the following features.
1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Daktronics ""All Sport 5000"".
 2. Control is operated with large membrane switches on custom designed cover layout with logical layout.
 3. Time section is controlled by durable positive switches.
 4. The control has easy to read two-line intelligent, 32 character LCD information display with time always display and other information called up instantly.
 5. Control has electric memory for individual play fouls, total team fouls and automatic setting of the bonus indicator.
 6. Control console has removable printed circuit card.
 7. Control ""continually refreshes"" the signal sent to the scoreboard display so it ""remembers"" information
 8. Clock has a 100 minute capacity in either remaining or lapsed mode.
 9. Provide the following accessories:
 - a. Remote hand-held control switches for game time and shot clock control.

- b. External battery control including 12V AC adapter, charger and carrying case.
 - c. 2.4 GHz spread spectrum radio controller utilizing hopping frequency technology with 125 mW transmitter power.
- G. Handheld controller (synthetic floor Gymnasium and Lower Field): Provide 900 MHz wireless device that controls specified scoreboard and timing displays. Handheld unit shall have a rechargeable Ni-MH battery for 8-10 hours of operation on a full charge.
- 1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Daktronics ""RC-200".
- H. Horn: Federal No. 31 constant duty scoreboard horn with a decibel level of 101.

2.3 SHOT CLOCK

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Daktronics "BB-2115".
- B. General: Provide two, wireless, 100 percent solid state single sided LED shot clocks including the following features:
- 1. One operator's hand held reset switch.
 - 2. Two semi-gloss black display modules with vibrating horn and 11 foot power cord.
 - 3. Manufacturer's standard portable signal kit.
 - 4. Visual horn indicator.
- C. Display modules: Lamp matrix numbers 13 inches high, red color, seven bar segments per digit with diffusant lenses over LED display for up to 140 degree viewing angle. Attach each display module, to adjacent wall surface as indicated on the Drawings or as otherwise directed by the Architect.
- D. Scoreboard housing: Completely enclosed, all aluminum construction, minimum 0.063 inch thick except back (0.050 inch thick). Cabinet shall be designed in manner to permit service access to plug-in components from front of the housing without the use of special tools.
- 1. Finish: Exposed exterior surfaces shall be immersion etched and finished in dark non-reflecting enamel matching scoreboard color.
- E. Control: Hand held reset switch.
- F. Horn: Vibrator type horn

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

- B. Beginning of installation means acceptance of project conditions.

3.2 INSTALLATION - GENERAL

- A. Perform wiring work as specified in Division 26 - ELECTRICAL.
- B. Install termination assemblies in designated system cabinets.
- C. Provide scoreboards as indicated on the reviewed and accepted shop drawings. Install equipment in accordance with manufacturer's instructions, and all applicable regulatory requirements.
 - 1. Locate scoreboards and timers as indicated on the Drawings.

3.3 WIRING

- A. Size wiring to conform to the exact requirements set forth by the equipment manufacturer.
- B. Splicing of system wiring shall be accomplished only in equipment back boxes, terminal cabinet or designated junction boxes.

3.4 CLEANING

- A. Clean scoreboards and timers under provisions of Section 01 73 00 – EXECUTION.

3.5 DEMONSTRATION

- A. Advise Architect after equipment has been set in place, adjusted and all electrical connections are finalized.
- B. Test equipment prior to demonstration.
- C. After it is shown that the equipment is operable and all equipment is in place, provide qualified and trained personnel to demonstrate operation of equipment and instruct Owner in operating procedures and maintenance so that they will be fully knowledgeable of all operating and service aspects of scoreboard and timer system.

3.6 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

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Section 11 66 53
GYMNASIUM DIVIDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install gymnasium dividers including all supporting channels and suspension rods, motorized lift unit and remote control devices.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 05 50 00 – METAL FABRICATIONS: Support connections to structural steel.
- F. Division 26 - ELECTRICAL: Electrical connections to motor unit, empty conduit from motor to control.

1.3 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Literature: Manufacturer's product data sheets for mounting system, including electrical characteristics.
 - 2. Manufacturer's installation instructions: Indicate special procedures, perimeter conditions and conditions requiring special attention.
 - 3. Manufacturer's certificates: Certify that Products provided under this Section meet or exceed specified requirements.

4. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 5. Shop drawings: Installation details showing mounting conditions, clearances, dimensions, and electrical connections.
 6. Selection samples: Sample card indicating Manufacturer's full range of fabric colors available for selection by Architect.
 7. Verification samples: 12 by 12 inch samples of vinyl fabric and netting, illustrating material and finish.
 8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
1. Manufacturer's warranty.
 2. Maintenance information for curtain raising mechanism, and cleaning information for vinyl cloth and netting material.

1.4 WARRANTY

- A. Provide manufacturer's standard warranty which shall include coverage of divider surfaces from discoloration. Warranty is in addition to and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Porter Athletic Equipment Company, Product: "Model Number "90208500".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Porter Athletic Equipment Company, Schiller Park, IL.
 2. Draper, Inc., Spiceland, IN.
 3. AALCO Manufacturing Company, St. Louis, MI.

- C. Sole Source: Manufacturer for the work of this Section shall be same as providing basketball gym equipment specified under Section 11 66 24.

2.2 VERTICAL LIFT DIVIDER CURTAINS

- A. Center roll divider, overhead supported, lift-type divider curtain meeting the following requirements:
1. Motor: Drive pipe power mechanism shall consist of a compensating type winch, 115 volt 60 cycle single phase reversible capacitor start motor capable of providing 20 feet/minute curtain operation, lubed-for life bearings, reversing magnetic contactor for remote control.
 - a. Provide 115 VAC, factory wired receiver with coding switch in manufacturer's standard non-metallic enclosure for each winch operating backstops. With a minimum 6 foot SJY cord with a NEMA L5-15 molded twist lock grounded plug. Enclosure shall have a 4 pole twist lock grounded NEMA L14-20 receptacle to accept power cable from electric winch equal to Porter "Sportsonic II Gymnasium Control System 12002-250". Coordinate with transmitter specified under Section 11 66 24 – BASKETBALL GYM EQUIPMENT.
 2. Remote controller: Equal to Porter No. 12002-100 complying with the following:
 - a. Quantity: One (1).
 - b. Range: 100 feet minimum.
 - c. Operation: Capable of controlling up to 99 devices.
 - d. Controller shall be the same model and manufacturer as controllers specified in Section 11 66 24 and Section 11 66 23. All controllers shall be functionally compatible.
 3. Cables: 1/8 inch diameter galvanized steel aircraft cables which terminate in individual storage drums.
 4. Curtain:
 - a. Bottom 8 feet of curtain is 18 ounce per square yard nylon or polyester reinforced vinyl, equal to Porter "Flexivide", with edge hems double welds, seams 1-1/2 inch full contact sealed seam. Sewn construction will not be permitted. Fabric shall be rot and mildew resistant and show minimum results of 300 pounds per inch tensile strength when tested in accordance with FS 191 and, have 100 pounds inch tear strength. Fabric shall have a Class I flame spread rating when tested in accordance with ASTM E84. Color shall be as selected from manufacturer's full available range.
 - b. Upper curtain: Vinyl coated polyester mesh approximately 50 percent open weave and weighing 9 ounces per square yard, equal to Porter "Fleximesh". Fabric shall have a minim tensile strength of 100 pounds/inch and be fire retardent. Color as selected by the Architect from the manufacturer's full available range of colors.
 5. Curtain batten: Rigid-coupled 1.9 inch diameter tubular steel batten, with padding.
 6. Safety strap: Manufacturer's standard as provided and rated for curtain weight anticipated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install suspension framing, channels and hanging rods.
- B. Install gymnasium dividers in accordance with manufacturer's instructions. Secure units level and plumb.
- C. Adjust each unit for operating positions, accurately establish lowered position in place.

End of Section

Section 11 68 13
PLAYGROUND EQUIPMENT

PART 1 - GENERAL

1.0 RELATED DOCUMENTS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:
01 30 00 – SUBMITTALS
01 43 39 – MOCK-UPS
01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
01 40 00 – QUALITY REQUIREMENTS; Testing and inspection.

1.1 DESCRIPTION OF WORK

- A. The work under this section shall include, without limitation, all labor, materials, and equipment required to install the playground equipment complete as specified. The equipment shall be assembled on site as per manufacturing recommendations and this section.

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
1. Section 32 18 16 – RUBBER SURFACING

1.3 SHOP DRAWINGS OR CATALOGS

- A. One copy (may be submitted digitally in pdf form) of shop drawings which show complete details including installation and layout will be provided for all items in accordance with Section 2-5.3 of the Standard Specifications.

1.4 GUARANTEE & LIABILITY INSURANCES

- A. Manufacturer shall guarantee all materials and workmanship for a period of one (1) year exclusive of vandalism. Manufacturer will be required to provide product liability insurance coverage in the minimum amounts of \$1,000,000.00 per incident.
1. The Manufacturer will be required to provide complete installation drawings including specifications and a replacement parts list for all products.
- B. Contractor shall provide a written guarantee on his firm's letterhead for all materials and workmanship for a period of one (1) year exclusive of vandalism. Written guarantee shall be submitted to the Owner at the final inspection prior to final acceptance of the work.

1.5 LOCATION INSPECTION

- A. No equipment or apparatus or foundations for same shall be placed until location stakes have been inspected and approved by the Architect.

1.6 QUALITY CONTROL

- A. Installer shall be certified installer with a minimum of 5 years' experience installing playground equipment in public school systems.
- B. Upon completion of installation, playground must be audited by third-party certified playground inspector and letter of certification submitted to Architect.

PART 2 - MATERIALS

2.1 YOUNG CHILD PLAY AREA EQUIPMENT (0-2 years)

Shall consist of the following items or equivalents listed below by Kompan Inc., Austin, TX, USA 800-426-9788, www.kompan.com; Goric Marketing Group USA, Inc. 464 Common Street #148 Belmont, MA 02478, p: 617.744.0772, www.goric.com, Landscape Structures, 601 7th Street South, Delano, MN, 888-438-6575, www.playsi.com; or GameTime (a PlayCore Company) 150 PlayCore Dr SE, Fort Payne AL, 800-238-2440, www.gametime.com as located on the drawings, colors TBD.

- 1. MSC 5414 Coupe Deluxe Under 2
- ~~2. M191 Toddler Spica Under 2~~
- 2. M18901-01P Little Elephant Under 2** (Final Bid Package)
- 3. PCM 000510 Talk and Tumble Under 2
- 4. MSC 5402 Treehouse Slide Toddler
- 5. MSC 5421 Home and Garden Labyrinth 2 Room

2.2 OLDER CHILD PLAY AREA EQUIPMENT (2-5 years)

Shall consist of the following items or equivalents listed below by Kompan Inc., Austin, TX, USA 800-426-9788, www.kompan.com; Goric Marketing Group USA, Inc. 464 Common Street #148 Belmont, MA 02478, p: 617.744.0772, www.goric.com, Landscape Structures, 601 7th Street South, Delano, MN, 888-438-6575, www.playsi.com; or GameTime (a PlayCore Company) 150 PlayCore Dr SE, Fort Payne AL, 800-238-2440, www.gametime.com as located on the drawings, colors TBD.

- 1. PCM 400104 Quad Tower Physical
- 2. PCM 000708 Music Panel
- 3. ELE 400158E Junior Spica

2.3 SAFETY SURFACING

See Specification Section 321816.12 Rubber Safety Surfacing.

PART 3 - EXECUTION

3.1 GENERAL

Installation shall be in the approximate locations shown on the drawings. Final approval of precise location by the Architect is required. In case of conflict between construction plans and manufacturer's requirements, the more stringent shall apply. All playground equipment shall be installed per manufacturer's instructions.

3.2 CONCRETE WORK

All concrete foundation work shall be performed in accordance with Division 3 Concrete.

3.3 CLEAN-UP

Project area shall be left clean and orderly upon completion.

END OF SECTION

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Section 11 68 23
TENNIS EQUIPMENT

PART 1 - GENERAL

1.0 GENERAL PROVISIONS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:
01 30 00 – SUBMITTALS
01 43 39 – MOCK-UPS
01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
01 40 00 – QUALITY REQUIREMENTS; Testing and inspection.

1.1 DESCRIPTION OF WORK

- A. Provide all equipment and materials, and do all work necessary to furnish and install the athletic equipment, as indicated on the drawings and as specified herein. Athletic equipment shall include but not be limited to:
1. Tennis Posts
 2. Tennis Nets
 3. Court Surfacing
 4. Enclosure fencing and gates

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
1. Section 32 12 16 - ASPHALT PAVING
 2. Section 32 31 13 – CHAINLINK FENCES AND GATES

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. American Sports Builders Association (ASBA)
 2. United States Tennis Association (USTA)

1.4 SUBMITTALS

- A. Manufacturers Product Data
1. Provide manufacturers product data prior to actual field installation work, for Architects' or Owners' representative's review.
- B. Shop Drawings
1. Provide drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Architects or Owners representatives review.
 2. Provide shop drawing layouts for replacement courts within the project area. 5 Courts will be replaced at universal sizes and markings for single and double play. Each court shall be a minimum of 21' clear of the backstop perimeter fence and 12' from sidestops and adjacent courts.

1.5 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.6 PRODUCT DELIVERY AND STORAGE

- A. Material delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners' representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.0 MANUFACTURER

- A. For Nets and Posts: Douglas Industries, Inc., 3441 S. 11th Ave. Eldridge, IA 52748; Phone: 800-553-8907, www.douglas-sports.com, Jaypro. www.jayprosports.com, Porter Athletic Equipment, www.porterathletic.com, or approved equivalent.
- B. For Tennis Court Surfacing: NOVA Sports US, Inc, 8 Commercial Way Milford, MA, 508-473-6540, www.novasports.com; Surface America, PO Box 157, Williamsville, NY, 14231, p: 716-632-8413, www.surfaceamerica.com; Classic Turf Company LLC, 437 Sherman Hill Road Woodbury, CT 06798, p: 800-246-7951, www.classicturf.org or approved equivalent.

2.1 MATERIALS

- A. Tennis Posts shall be: Douglas DTP-37 (item #63007) and DS-24 (item #63424) or approved equal.
1. COMPONENTS:
- 3"OD Round 7 Gauge Heavy Wall (3/16") Steel
 - Internal Wind 30:1 Self-Locking Gears
 - Welding Lacing Rods
 - Die-Cast Zinc Caps and Gear Housings
 - Polyester Powder Coat Finish, Available Forest Green #63007 or Black #63008
 - Galvanized Steel Ground Sleeves, GS-24RD/ST #63424
- B. Tennis Nets shall be: Douglas TN-30DM Tennis Net #30030 or approved equal.
1. COMPONENTS:
- 3.0mm Solid Core Knotted Braided Polyethylene with 285 lb. Break Strength
 - Top Six Rows Hand-Braided Double Mesh Netting
 - 2-Ply Vinyl Coated Polyester Headboard
 - Black Vinyl Side Pockets with Fiberglass Dowels
 - Standard Net Dimensions: 3'6" high X 41'9" long (3' height in the center of the court)
- C. Net Center Tie Down Anchor shall be: Douglas #63428 or approved equal
- 2 inch galvanized pipe ground sleeve. To be cemented into court 9 inches deep.
- D. Adjustable Center Strap: Douglas #20600 or approved equal
- 2 inch wide polyester white web, nickel plated web slides and snaps.
- E. Tennis Court Surfacing shall be:
- Laykold Masters Color Tennis Court Surfacing by Surface America;
 - Classic Turf Sports Surface 11-layer system by Classic Turf Co.
 - Novacrylic 2 Coat Combination Surface System by Nova Sports USA, 8 Commercial Way Milford, MA; www.novasports.com
 - Surfacing shall be applied to new asphalt base with a highly flexible acrylic emulsion used for asphalt substrate surface preparation. Used on new asphalt substrates only
 - Filler: a flexible, factory textured emulsion used as an interface coating

- c. Top Coat: a flexible, Slip-resistant, wear-resistant, UV stable color acrylic sport surface with a clear drying acrylic emulsion line primer.
- d. Textured White Line Paint: a factory textured, wear-resistant acrylic line marking paint.

F. Chain Link enclosure fence and gates

- 1. See Section 32 31 13 – CHAINLINK FENCES AND GATES

PART 3 - EXECUTION

3.0 INSTALLATION OF EQUIPMENT

- A. All existing tennis courts require complete reconstruction. Contractor is to grind existing asphalt, provide new asphalt base, surfacing, equipment and fencing.
- B. All athletic equipment shall be installed as recommended with manufacturer's written directions, and as indicated on the drawings.
- C. Project is to replace the (5) existing courts matching their current layout and dimensions. Each court is a universal size of 78' x 36' and shall be standard striped for double and single play.

END OF SECTION

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Section 11 68 33
ATHLETIC EQUIPMENT

PART 1 - GENERAL

1.0 RELATED DOCUMENTS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:
01 30 00 – SUBMITTALS
01 43 39 – MOCK-UPS
01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
01 40 00 – QUALITY REQUIREMENTS; Testing and inspection.

1.1 DESCRIPTION OF WORK

- A. This Section includes sports equipment consisting of the following:
1. Football goalposts
 2. Ground Sleeve for goalposts
 3. Post access frame and plate
 4. Ball Safety Net
 5. **Soccer Goals and Nets**
 6. **International Corner Flags**
 7. **Bullpens**
 8. **Bases**
 9. **Home Plate**
 10. **Pitcher's Rubber**
 11. **Fence Safety Cap**
 12. **Foul Pole**
 13. **Modular Dugout System**
 14. **Dugout Benches**
 15. **Dugout Bat Racks**
 16. **End and Corner Post Padding** (Final Bid Package)

1.2 RELATED WORK

- A. Related Sections include the following:
1. Section 03 30 01 CAST IN PLACE CONCRETE – SITE; for concrete footings.
 2. Section 26 00 01 ELECTRICAL; for power and control wiring routed to/from scoreboard and clocks
 3. Section 32 12 93 ARTIFICIAL TURF
 4. **Section 32 90 20 NATURAL FIELD SPORT SURFACING**
 5. **Section 77 62 50 SKIN, MOUND CLAY, AND WARNING TRACK**

- B. **Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.**

1. **Massachusetts Interscholastic Institution** (Error! Reference source not found.)
2. **National Collegiate Athletic Association (NCAA)**
3. **American Society of Testing and Material (ASTM)**
4. **National Federation of State High Schools (NFSH)**
(Final Bid Package)

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated include construction details, material descriptions, testing data, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For each type of equipment include materials, plans, elevations, sections, details, method of field assembly, connections, and installation details.
- C. Samples for Verification: For the following products, for each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected. Architect reserves the right to require additional Samples that show fabrication techniques, workmanship, and design of playground equipment.
 - 1. Posts: Not less than 6 inches (150 mm) long.
 - 2. Ground Sleeves – furnish 3 inch section of full sized unit.
- D. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1. Paints and similar finishes.
 - 2. Wood Preservative Treatment: Include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - 3. Recycled plastic.
- E. Maintenance Data: For equipment and finishes to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer who has specialized in providing work similar in material, design, and extent to that indicated.

1.5 PROJECT CONDITIONS

- A. Layout: Provide locations for inserts in accordance with field sizes recognized as NFSHSA and industry standards.
 - 1. Notify Architect during layout and prior to placement.
 - 2. Do not proceed with placement without Architect's written permission.
 - 3. Before excavating, verify that no conflicts exist with underground services, piping or irrigation systems.

PART 2 - PRODUCTS

2.0 PRODUCTS AND MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Draper Inc www.draperinc.com

2. Jaypro, www.jayprosports.com
3. PW Athletic Mfg. Co., www.pwathletic.com
4. Porter Athletic Equipment, www.porterathletic.com
5. SportsEdge Solutions, www.sportsedge.com
6. SportsField Specialties, www.sportsfieldspecialties.com
7. Keeper Goals, www.keepergoals.com

2.1 SPORTS EQUIPMENT, GENERAL

A. Colors: Goalposts: TBD

1. pads in school colors

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and to comply with performance requirements for structural aluminum; mill finish or decorative baked-enamel powder-coat finish.

1. Extruded Bars, Profiles, and Tubes: ASTM B 221.

B. Steel: Comply with the following:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M, hot-dip galvanized.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53 or electric-resistance-welded pipe complying with ASTM A 135, with a minimum yield strength of 30,000 lbf/sq. in. hot-dip galvanized internally and externally.
3. Steel Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513 or steel tubing fabricated from steel complying with ASTM A 569/A 569M and complying with the dimensional tolerances in ASTM A 500; with a minimum yield strength of 40,000 lbf/sq. in. and a minimum tensile strength of 45,000 lbf/sq. in.; zinc coated internally and externally.

C. Hardware: Manufacturer's standard, commercial-quality, corrosion-resistant, hot-dip galvanized steel and iron, stainless steel, or aluminum; secure, vandal-resistant design.

D. Fasteners: Manufacturer's standard, corrosion-resistant, hot-dip galvanized or plated steel and iron, or stainless steel; permanently capped; theft resistant.

E. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:

1. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

F. Paint and PVC-Coat Finish: Comply with 16 CFR 1303 for limiting lead in paint.

2.3 FABRICATION

A. General: Provide sizes, strengths, thicknesses, wall thickness, and weights of components as required to comply with structural performance and other requirements. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete structure, including supporting members and connections

2.4 FOOTBALL GOALPOSTS

- A. Single post gooseneck design meeting NFSHSA rules, providing a minimum setback of 8'-0" from the crossbar. Upright schedule 40 Class C 6.625" O.D. minimum. Fabricate in length to provide minimum 5'-0" embedment in ground sleeve
 - 1. Crossbar: 6.625 dia. aluminum. 0.25 wall thickness
 - 2. Uprights: Spaced 23'-4" apart, type 4226 4 inch diameter aluminum tubing with 0.154 wall thickness. 20 foot height
 - 3. Color: White or Yellow, TBD with Owner review
- B. Design Standard: Sportsfield Specialties GP 4380
 - 1. The use of a Design Standard establishes a level of quality for the work and is not to be construed as a limit of trade or a restriction of competition.
- C. Upright padding for goalpost uprights 6 inch foam covered in 18 oz. UV resistant vinyl, 72 inch height. Color and Logo TBD with Owner review
- D. Pole Access Frame and plate: cover plate nominal 2 x 2 square with circular cut-out for post upright with access panel set in concrete edging, cap panel to be wrapped in artificial turf. Equal to Sportsfield GP4570 access frame kit.
- E. Goal Post Foundation: Ground sleeve assembly minimum 7'6" deep to be set in concrete foundation, with provisions for bolts assembly to anchor and center uprights in sleeve.
- F. Wind flags atop uprights clip mounted to eyebolt – Provide 4 per goalpost with one mounted per upright
- G. Ball Safety Net: Safety netting shall be straight ball stop 40' H x length as shown on Drawings. Poles 8" diameter aluminum, color and finish TBD. Poles shall rest in a 72" deep Aluminum ground sleeve that includes a stainless steel stop-bolt preventing pole spin. Mesh net shall be 4" square, knotless high tenacity polypropylene (HTPP) with extra UV stabilizers and shall have a break strength of 180lbs or greater. Net is supported by vinyl coated galvanized steel 7 x 7 Aircraft Cable at top and bottom. Include stainless steel or marine grade steel Rope Pulley System for raising and lowering net. Maximum distance between poles not to exceed 40 feet. Length of net as shown on drawings.

2.5 SOCCER GOALS (FULL SIZE PLAY)

- A. **Soccer goals shall be synthetic turf type (without ground sleeves) precision-crafted, official size (24' wide, 8' high, 3' top and 8' bottom depths) soccer goals are engineered from hi-tech aluminum alloys for maximum durability. The main frame is fabricated of 4" rounded safety stock slotted heavy-wall aluminum extrusion. The goal mouth features a white powder-coated finish for minimal maintenance. Goals shall be Sports Field Specialties SG4900, AAE SGR-P, Kwik Goal Evolution 3.1 or approved equal. Provide two (2) sets.**
- B. **Goals shall include large loop stays and a ground bar made of 2" sq. slotted heavy-wall aluminum extrusion with rounded safety corners. The crossbar and ground bar each incorporate a one-piece design (no horizontal joints) for added stability. Goals shall be equipped with Rollaway Wheels.**
- C. **Nets shall be suitable for natural turf applications and operate safely without ground sleeves. A weighting system shall be provided to anchor the ground bars to the turf.**
- D. **The slotted aluminum extrusions shall be designed to accept two different Net**

Attachment Systems. Molded Net Clips, and VNS Vinyl Net Strips.

- E. Soccer nets: Two complete sets containing two nets each per goal.**

2.6 INTERNATIONAL CORNER FLAGS

- A. Corner flags shall be 60" tall x 1 1/2" O.D. PVC uprights, Steel spring base with weighted bases for synthetic turf. Provide one (1) sets of four.**
- B. Corner flags shall be 60" tall x 1 1/2" O.D. PVC uprights, Steel spring base with round base and anchor spike for natural turf fields. Provide three (3) sets of four.**

2.7 BULLPEN

- A. The bullpens shall have an 8 foot tall at each end behind the pitcher's mound and the home plate area. Fencing along the sides will be field specific. The varsity softball bullpens at the synthetic turf field shall have a synthetic surface and a 6 foot tall fence at the outer fence line and the foul territory. The junior varsity softball and baseball shall have a 5 foot fence at the field side chain link enclosure with an open edge away from the field. The project includes a total of six (6) bull pens. Four (4) natural turf and two (2) synthetic turf.**
- B. Posts shall be set in concrete footings. Concrete shall be 3,000 psi concrete.**
- C. The ground surface located 1'-0" beyond the ground sleeve footings shall be skinned infield surfacing.**
- D. Home plate shall be Hollywood anchored molded rubber on stanchion mounted steel plate with in-ground anchor and plug.**
- E. Pitcher's rubber shall be Hollywood anchored molded rubber on dual stanchion mounted steel plate with in-ground anchor system and plug.**
- F. The Catcher's box and pitchers mounds for the JV fields shall be built-up skin infield section. The catcher's box and mound for the synthetic softball field shall have a full synthetic turf system.**
- G. Skin shall meet the requirements of 116850.**

2.8 HOME PLATE

- A. Natural turf grass home plate shall be Hollywood anchored molded rubber on stanchion mounted steel plate with in-ground anchor and plug. Provide five (5) for softball and four (4) for baseball. This includes one (1) for the JV baseball game field, one (1) for the JV softball game field, four (4) for the four natural grass bull pens, and two (2) for the JV softball and JV baseball cages and one (1) of the varsity softball cage.**
- B. Synthetic turf game field home plate shall be Hollywood anchored molded rubber on stanchion mounted steel plate with in-ground anchor and synthetic turf blanking plug (suitable for play over the plate location). Provide one (1) for the game field.**
- C. Synthetic turf bull pen home plates shall be Hollywood anchored molded rubber on stanchion mounted steel plate with in-ground anchor and standard plug. Provide two**

(2).

2.9 Bases

- A. The natural turf grass bases shall be soft-touch type with 6" stanchions. Patented chevron design allows the base to compress upon impact. Include set of 3 (no anchors or plugs -- fits 1-1/2" anchors) anchored molded rubber on stanchion mounted steel plate with in-ground anchor and plug. Provide two (2) sets, one for JV softball and one for JV baseball.**
- B. The synthetic turf bases shall be soft-touch none-stanchions bases with molded anchoring cleats. Provide one (1) sets.**

2.10 Pitcher's rubber

- A. Natural turf grass pitcher's rubber shall be Bulldog all rubber pitching rubber with 3" core weighting 40 pounds. Provide four (4) for JV softball, four (4) for JV baseball and one (1) for the varsity softball cage.**
- B. Synthetic turf field pitching rubber shall be Hollywood dual-stanchions plate with 6" stanchions with in-ground anchor and synthetic turf blanking plug (suitable for play over the plate location)s. Provide one (1) set.**
- C. Synthetic turf field pitching rubber for the bull pens shall be Hollywood dual-stanchions plate with 6" stanchions with in-ground anchor and standard plug. Provide two (2) set.**

2.11 FENCE SAFETY CAP

- A. Fence safety cap at the stadium synthetic turf field shall be Beacon Athletics Fence Guard Premium, grade 3"W x 4-1/2"H x 8'L with .09" material thickness, constructed of heavy-duty, UV-resistant polyethylene. Secured with ties through predrilled holes. Color shall be yellow.**
- B. Fence safety cap shall be installed at all 63 and 75 inch outfield fence and the 53 inch sideline fence. Cap shall cover all fence less than 8 foot in height for all three venues including portable outfield fencing.**

2.12 FOUL POLE

- A. Foul Poles at varsity softball shall be Long Gone 15 foot foul pole with wing, turf access cover and turf blanking lid or approved equal. Provide two (2).**
- B. Foul Poles at junior varsity baseball and softball shall be Long Gone 15 foot foul pole with wing (as modified below) or approved equal. Provide four (4).**
- C. Wing shall start at 8 feet above grade. Pole shall be constructed of 4" aluminum sch 40 piping and shall be power coated yellow with in-ground sleeves. Wing shall consist of a 1/8" stamped aluminum sheet with double reinforced bends.**

2.13 DUGOUT BENCHES

- A. Provide six (6) Dugout bench systems which shall be fixed players benches with storage shelf back seating deck. Each dugout bench for varsity softball shall be 24 feet in length (two 12' benches in each dugout) and have 2" x 10" anodized aluminum seat plank and shelf board. Back board shall be 2" x 8" anodized aluminum plank.**

Each dugout bench for the junior varsity fields shall be 20 feet in length (two 10' benches in each dugout) and have 2" x 10" anodized aluminum seat plank and shelf board. Provide one per dugout.

B. Benches shall be fixed to concrete slab.

C. Benches shall have a 5 year warranty.

2.14 DUGOUT BAT RACKS

A. Provide six (6) dugout bat racks. Bat racks shall be Dugout Caddy baseball bat rack shall be constructed of ¼" ABS black composite plastic and shall be 36 inches long. Rack shall include chain link fence mounting hardware to lock Caddy to fence. Provide (one per dugout).

B. Each rack shall have the name the school wants using stick-on vinyl.

2.15 TRASH RECEPTICALS

A. Provide (6) Trash receptacles shall be black with hinged top and large plastic container. Top shall be cabled without lock.

B. Provide (6) Recycle Bins shall be Standard black coated bins.

2.16 MODULAR DUGOUT SYSTEM

A. The modular dugout system shall be a prepackaged fully designed system requiring on-site installation designed in accordance with State of Massachusetts Building Codes and shall have the following minimum design requirements:

- 1. Maximum Wind Speed Load: 130 mph**
- 2. Maximum Ground Snow Load: 50 psf**
- 3. Seismic = Ss=150%, S1=75%**
- 4. Optimum Roof Pitch = 2" to 120"**

B. COMPONENTS:

- 1. Overall dimensions and materials sizes:**
 - a. Width of Roof: 8'-6".**
 - b. Length: Junior Varsity Baseball 24'-0".**
 - c. Interior Clear Height: 7'-6"**
 - d. Structural columns fabricated of 3.5" x 3.5" x 3/16" (0.1875") thick steel tube with factory pre-drilled 9" x 9" x 1/2" (0.5") thick steel base mounting plates and 9" x 9" x 3/8" (0.375") thick steel roof and column cap plates, welded construction**
 - e. Maximum allowable spacing between structural steel columns shall be fifteen feet (15') on center**
 - f. Roof Frame shall be fabricated of 5" x 2" x 3/16" (0.1875") thick steel rectangular perimeter and transverse tubes and 3" x 2" x 1/8" (0.125") thick steel rectangular longitudinal tubes, welded construction. Roof shall be fully assembled and be equipped with carbon steel anchoring hardware consisting of epoxy and lifting eye bolts**
 - g. Structural steel columns and roof frame receive a powder coated primer and finish from standard manufacturer colors.**
 - h. Roofing material is 29 gauge, classic rib style corrugated metal with j-channel drip cap installed on front and sides, various standard paint**

- finish colors available*
- i. Structural columns attached to roof structure with galvanized hardware*
 - j. System shall include all required hardware and Installation Instructions*
 - k. Package shall include Stamped and Sealed Drawings and Calculations by a Licensed Professional Engineer of Record in the State of New York*

C. DUGOUT CHAIN LINK ENCLOSURE SYSTEM:

- 1. All sides and the back of the dugout shall be enclosed with an infill type panel chain link fence panel system constructed of 2" diameter welded posts and rails frame with square post to round frame brackets which align the frame with the outside edge of columns. The front face fencing shall be integral with the field side fencing. Fence fabric shall meet the requirements of Chain Link Fence and Gates.**

2.17 END AND CORNER POST PADDING

- A. Fence safety pad shall be Beacon Athletics Rail Padding. 3"-inch thick padding with 2.25" ID. Color shall be school colors with Owner approved graphics.**
- B. Provide full height padding at outside corner at fence angles and locations where fence height changes at foul territory and outfield fence locations. Provide (7) seven full height pads. (Final Bid Package)**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, site surface and subgrade drainage, and other conditions affecting performance.**
 - 1. Do not begin installation before final grading required for placing protective surfacing is completed, unless otherwise permitted by Architect.**
- B. Proceed with installation only after unsatisfactory conditions have been corrected.**

3.2 PREPARATION

- A. Verify that layout and equipment locations comply with requirements for each type and component of equipment.**

3.3 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Anchor equipment securely, positioned at locations and elevations indicated on Shop Drawings.**
- B. Post and Footing Excavation: Hand-excavate holes for posts and footings to dimensions, profile, spacings, and in locations indicated on Drawings, in firm, undisturbed or compacted sub-**

grade soil. Level bearing surfaces with drainage fill to required elevation.

- C. Post Setting: Detail by manufacturer. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Verify that posts are set plumb or at the correct angle and are aligned and at the correct height. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
1. Where required by documents or recommended by manufacturer, provide sleeve in footing to receive standard.
 2. Concrete Footings: Smooth top, and shape to shed water.

3.4 CLEANING

- A. After completing equipment installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION

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Section 11 68 50
SKIN, MOUND CLAY, AND WARNING TRACK

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

- A. The General provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements and Division 01 General Requirements, apply to work specified in this section.
- B. Carefully examine all of the Contract Documents for requirements which affect the work of this Section. The exact scope of work of this section cannot be determined without a thorough review of all Specification Sections and other Contract Documents.
- C. Refer to Drawings for further definition of location, extent, and details of work described in this Section.
- D. Cooperate and coordinate with other trades in executing work as described in this Section.
- E. Where referred to, Standard Specifications, Recommendations of Technical Societies, and/or Manufacturer's Associations, plus Codes of Federal, State, and Local Agencies shall include all amendments current as of date of issue of these Specifications.
- F. In all cases when conflict exists between information contained in this Section and in other parts of the Contract Documents, the Contractor shall assume that the most expensive solution is required.
- G. In all cases, when a question exists to the level of quality required for a product and/or installation, the highest quality is required.

1.2 SCOPE

- A. Provide all products, materials, labor, equipment, and coordination necessary for, complete installation of the fixed and non-fixed equipment. Furnish and install all materials and equipment as depicted in the Contract Drawings, manufacturer recommendations and guidelines, and or as specified herein. Provide all components necessary to form a complete and operating whole.
- B. Skin, Mound Clay and Warning Track surfaces shall be placed in conformance with the lines, grades, thicknesses and typical sections as shown or detailed on the Drawings, and or as specified herein.
- C. The Contractor is responsible for the purchase of installation of all fixed and non-fixed items.
- E. The work shall be coordinated with the installation of the irrigation and drainage piping.
- F. Related Work Specified in Other Sections:
 - 1. Section 11 68 33, "Athletic Field Equipment."
- G. The work covered in this section may be affected by Alternates contained in Section 01 23 00 – Alternates

- H. The Contractor is responsible for all associated testing both preliminary and construction monitoring testing required to complete the sand/sol blending operations and placement.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. In cases where the references listing below are not the most recent, the most recent standards and requirements shall govern.
1. American Association of State Highway and Transportation Officials (AASHTO) "Standard Specification for Geotextile Specification for Highway Applications" Designation M 288-05
 2. MA Standard Specifications for Road and Bridge Construction
 3. American Society of Testing Methods (ASTM) F08
 4. National Collegiate Athletic Association (NCAA)
 5. American Society of Testing and Material (ASTM)
 - a. 2107 Standard Guide for Construction and Maintenance of Skinned Areas on Baseball and Softball Fields
 - b. F2270 Standard Guide for Construction and Maintenance of Warning Track Areas on Athletic Fields.
 - c. C144 Standard Specification for Aggregate for Masonry Mortar
 - d. D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

Part 2 – PRODUCTS

- 2.1 Skin Infield Surface for natural turf infield areas, bull pens and batting cages.

- A. Skin infield mix shall be MASSDOT stone dust meeting the requirements of M2.05.0 Modified.

Sieve Size	Sieve Designation	% passing
4.75 mm	No 4	100
3.35 mm	No. 6	94-100
2.36 mm	No 8	90-96
1.18 mm	No 16	60-80
0.425 mm	No. 40	40-55
0.250 mm	No. 60	15-35
0.150mm	No. 100	0

- B. Sand Base: Sand shall meet the requirements of ASTM C141 for washed mason type sand.

2.2 WARNING TRACK MATERIAL

- A. Warning Track mix shall be an imported engineered soil product which is mechanically mixed offsite in a controlled environment using a pugmill-type mixer. Material shall meet the criteria of ASTM F2270 plus the following criteria and be all natural ingredients, free from organic materials, red in color and no separation of ingredients, meeting the following mechanical analysis:
1. Warning Track shall be clean, crushed brick mixed with #10 lime stone resulting in a mix that is reddish brown in color, having a yield of 1.3 tons per cubic yard and possessing the

following particle size analysis:

Sieve Size	Sieve Designation	% passing
9.5 mm	3/8"	100
4.75 mm	No. 4	85-100
2.00 mm	No. 10	70-80
1.00 mm	No. 18	40-60
500 µm	No. 35	35-55
250 µm	No. 60	15-35
150 µm	No. 100	10-30
53 µm	No. 270	5-10

2. Limestone base shall be 2A limestone and limestone dust as per City of Worcester standard.

2.3 MOUND AND HOMEPLATE CLAY MATERIAL

A. Mound Clay shall be an imported engineered soil product which is mechanically mixed offsite in a controlled environment using a pugmill-type mixer. Mixture shall be all natural ingredients, free from organic materials, red in color and no separation of ingredients, meeting the following mechanical analysis:

1. Shall be a blend of natural clay(s).
2. Clay shall be blended by use of pugmill and metering controls.
3. Clay shall coat all soil particles and remain moist and tacky and playable for 6 months after product installation without supplemental water beyond surface wetting.
4. Finished mound shall remain firm through rain, snow, or drought.
5. The Mound (and plate area) should be protected from rain and snow by use of a mound cover.
6. The material possesses the following particle size analysis:
 - a. Total sand content shall be 25-40 percent.
 - c. The combined amount of silt and clay shall be 60-75 percent.
 - d. The ratio of silt divided by clay, otherwise known as the SCR, shall be 0.5 – 1.0.
 - e. No particles greater than 3.35 millimeters.
 - f. Sand size distribution (not including silt plus clay fraction) shall be as follows:

Sieve Size	Sieve Designation	% passing
3.35 mm	No. 6	100
2.00 mm	No. 10	95-100
250 µm	No. 60	0-40
150 µm	No. 100	0-20
53 µm	No. 270	N/A

PART 3 EXECUTION

3.1 INFIELD MIX INSTALLATION

A. LAYING: The clay/sand mixture shall be spread over the surface in a minimum of two (2) layers each approximately three inches (2-3") thick, thoroughly raked to break up the clay and to mix in the sand so as to make a homogeneous mixture of sand and clay and each layer hand-rolled to a thickness of approximately one and one half inches (1-1/2"). After rolling the first layer the surface

shall be lightly scarified with a rake before applying second layer. The aggregate thickness of the two (2) layers in finished topping shall be three inches (3") for the softball fields.

3.2 WARNING TRACK INSTALLATION

- A. Area to receive warning track material shall first, excavate material from the warning track area to a depth of 7 inches below the final finished grade.
- B. Compact the subgrade until 90 to 95 percent compaction is achieved.
- C. Install geotextile fabric to prevent future weed migration through the warning track area.
- D. On top of the geotextile fabric, place 3 inches of 2A limestone capped with 1 inch of limestone dust, for a total of 4 inches.
- E. Finally, place the warning track material over the top of the limestone dust. The depth of the warning track material should be 3 inches at completion after compaction.
- F. When placing both the limestone and the warning track material, use lifts of 2 inches and compact with a minimum 1-ton vibratory roller until an optimum compaction between 90 percent and 95 percent is achieved. Scarify the surface to facilitate bonding of the next lift and repeat until finish grade elevation is achieved. Completing this process as described will minimize settling and improve the performance of the product.
- G. The warning track and limestone layers beneath it must have a 1 percent slope toward the outfield fence.

3.3 MOUND AND HOMEPLATE CLAY MATERIAL INSTALLATION

A. BASBALL MOUND:

- 1. Approximate material required for the shall be 0.75 to 1.0-tons of mound clay
- 2. Layout of Circle
 - a. Measures: 9' radius / 18' diameter
 - b. Center of circle: 59' from back tip of homeplate
- 3. Layout of Mound
 - a. Height of mound: **10" above homeplate** in accordance with the rules. Note that the grading plan typically indicates a rise in grade of 2" to 4" from homeplate to the front edge of the pitcher's mound.
 - b. Distance from back tip of homeplate to front of pitching rubber: 60'6"
 - c. Begin by building platform for pitching rubber first with mound clay.
 - d. Place material in 2" lifts and compact using a hand tamp until desired height is achieved.
- 4. Platform
 - a. Build a flat top around pitcher's rubber.
 - b. Generally platform measures 36" in length and 60" in width.
 - c. The platform should extend 6" in front of the rubber and 23" in back of rubber.
 - d. The platform should extend 18" on either side of the rubber.
- 5. Mound Gradation
 - a. Start sloping area in front of platform downwards 6" in front of the pitching rubber.
 - b. From platform mound extends 10' towards homeplate.
 - c. Front Slope: for each 1' distance, the grade should drop by 1".
 - d. Gradually slope the rear of mound from the back of pitching mound to the circle's edge.

C. HOMEPLATE AREA:

1. Set homeplate and square it with the pitching rubber. Layout complete area based on extents depicted in the drawings.
2. Homeplate area: (Including batter's and catcher's areas) Excavate an 8' X 13' area to a to 4" depth representing approximately 1.5 to 2.0 tons of mound clay.
3. Place mound clay in excavated areas in 1 ½" to 2" lifts. Tamp to compact. Repeat process with each layer to finish grade. Finish grade shall slope uniformly across plate area and down towards backstop area.

D. GRADING:

1. Grading shall be performed to prevent ponding within infield and clay areas. The final surface shall be checked with levels, straight edges and string-lines to prevent areas (micro-undulations) which hold or pond water.
2. Areas where infield materials meet turfgrass shall be graded to prevent ponding along these edges. Edges shall be rolled to create a smooth uniform planar transition between these two surfaces.
3. The infield, mound and plate areas shall be flooded to allow identification and correction of areas where grading and surfaces promote ponding and wet spots within and along edge interfaces of the sport surfaces. Perform this testing by use of irrigation sprinklers and over-application of water until saturation occurs. Once saturation and surface water occurs then turn off sprinklers and observe area as it dries/drains to identify any ponding/wet spots.
4. Where drainage flow is from infield areas to turfgrass and water is trapped or ponded on the turfgrass edge, or vice a versa, surfaces shall be adjusted as directed by the Engineer to eliminate this condition. This may require top dressing of turfgrass areas, regrading of infield areas, rolling of other suitable approved methods. The end result shall be no ponding.

END OF SECTION 11 68 50

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Section 11 95 13
KILNS

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists providing electric kilns where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following:
 - 1. Furnish and install electric kilns where indicated on the Drawings.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the General Contractor and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the General Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated General Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 09 30 13 – CERAMIC TILING: Ceramic tile finishes adjacent to kiln construction.
- E. Section 09 64 53 – LINOLEUM FLOORING: Linoleum flooring at kiln construction..
- F. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING: Kiln ventilation systems, complete with ductwork, hangers, and insulation.
- G. Division 26 - ELECTRICAL: External wiring, not integral with the equipment furnished under this Section.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. UL: Approved individual equipment, and component, listings and standards.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets and specifications, for each product installed and furnished hereunder clearly indicating configurations, sizes, materials, finishes, locations, utility connections and locations. Include information on accessories and options.
 2. Manufacturer's installation instructions: Indicate special procedures, perimeter conditions and conditions requiring special attention.
 3. Manufacturer's certificates:
 4. Certify that Products installed under this Section meet or exceed UL and specified requirements.
 5. Manufacturer's sample warranties.
 6. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
 1. Operation Data for all installed and furnished equipment.
 2. Manufacturer's warranties: Include coverage of installed equipment.
 3. Maintenance Data: Include periodic maintenance requirement schedules.

1.5 QUALITY ASSURANCE

- A. Kiln manufacturer specializing in producing the work of this Section with a minimum of 5 years documented successful experience.
- B. Perform work to the following certification standards:
 1. Electrical wiring and components: Conform to UL standards.

1.6 REGULATORY REQUIREMENTS

- A. Provide and install the work of this Section in conformance with all applicable federal, state and municipal codes, laws and regulations regarding utilities, health, fire protection and safety.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with interfacing work. Ensure that the work performed is acceptable to respective trades responsible for interfacing work.

1.8 WARRANTY

- A. Additionally provide manufacturer's standard warranties under the provisions of Section 01 78 00 - CONTRACT CLOSEOUT that exceed the one year period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on "Model EX-1850SF" manufactured by AMACO/Brent, Indianapolis, IN.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. AMACO/Brent, Indianapolis, IN.
 - 2. Skutt Ceramic Products, Inc., Portland, OR
 - 3. L & L Kiln Manufacturing, Inc., Boothway, PA
 - 4. Olympic Kilns, by Haugen Manufacturing, Inc., Flowery Branch, GA.

2.2 KILNS

- A. Kiln: UL listed, multi-sectional, modular, ceramic kiln with reversible lid and floor slabs and 3 inch firebrick walls.
 - 1. Power requirements: 3 phase, 208 volt.
 - 2. Electrical rating: 76.0 amps.
 - 3. Temperature rating: Cone 022 to Cone 10.
 - 4. Capacity: 18.5 cubic feet
 - 5. Control features: Touch pad type with digital readout with integral temperature scale selector, firing program review and preprogrammed cone tables having the following characteristics:
 - a. Delayed firing start controls: Delay up to 99 hours, 99 minutes.
 - b. Adjustable temperature alarm.
 - c. Cone firing mode: Programmable by Cone Number with cone range of Cone 022 to Cone 10.
 - d. Ramp/hold mode: Manual entry by temperature, allowing creation of custom programs from 1 to 8 segments with ability to specify the rate of

heating or cooling within each segment and optional hold feature up to a maximum temperature of 2400° Fahrenheit.

- e. Firing speeds: Slow, medium or fast settings for heating
 - f. Memory capacity: Store up to six firing programs.
 - g. Safety features: Power failure detection, thermocouple failure detection, microprocessor fault detection.
- B. Kiln Venting System: "Master KilnVent" by AMACO/Brent, Indianapolis, IN. or approved equal complying with the following characteristics and components:
- 1. Materials: Stainless steel plenum, duct and blower housing.
 - 2. Power: 115 volt household current.
 - 3. Motor: 115 volt, 1.1 amp, 60 Hz.
 - 4. Total airflow: 72 cfm.
 - 5. Provide 8 feet of 3 inch diameter flexible aluminum intake duct.
 - 6. Provide mounting plates for either floor mount or wall mounting allowing for field adjustment and drilling of mounting plate.
 - 7. Automatic control of kiln exhaust fan based on kiln operation.
 - 8. Provide fan proving switch for interlock to HVAC system.
- C. Provide rough-in hardware, supports and connections, attachment devices, and accessories.

PART 3 - EXECUTION

1.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Notify the Contractor, and copy to Architect, in writing of any conditions detrimental to the proper and timely completion of the work, and do not proceed with the work until said conditions are corrected.
- B. Verify clearances required for equipment.
- C. Verify ventilation outlets, service connections, and supports are correct and in required location.
- D. Verify that electric power is available and of the correct characteristics.
- E. Beginning of installation means acceptance of existing site conditions.

3.2 INSTALLATION

- A. Install each product in accordance with manufacturers' instructions.
- B. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.
- C. Anchor equipment using standard devices provided by the manufacturer appropriate for equipment, substrate and expected usage.

3.3 ADJUSTING

- A. Adjust work under provisions of Section 01 73 00 - EXECUTION. Adjust equipment and apparatus to ensure proper working order and conditions.

End of Section

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Section 12 21 16
VERTICAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install vertical louver blinds and supplementary items required for installation at interior and exterior view windows as indicated on the Drawings.
 - 1. Provide vertical louver blinds at the following locations: Offices, Conference/Meeting Rooms, Large group Seminar Room and Medical Spaces.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the General Contractor and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the General Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated General Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Blocking for window blind systems.
- F. Section 09 29 00 - GYPSUM BOARD: Substrate for window blind systems.
- G. Section 09 51 00 - ACOUSTICAL CEILINGS: Relationship of blinds to acoustical ceilings.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. NFPA Publication 701 - Standard Methods of Fire Tests for Flame-resistance Textiles and Films.
2. UL Publication 214 - Standard for Tests for Flame Propagation of Fabrics and Films.

1.4 PERFORMANCE REQUIREMENTS

- A. Fire performance characteristics; shade material tested in accordance with NFPA 701- Vertical Burn Test, rated "FR".

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Product Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Provide additional information required for vane materials, including: Size limitations, fire resistance information.
 - b. Note on submittals any deviations from specified requirements and the reasons thereof.
 2. Maintenance Information: Maintenance data and recommended cleaning materials, and cleaning and stain removal methods.
 3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 4. Certification of compliance with current building code and environmental regulations: Manufacturer shall certify that materials proposed for use comply with applicable building code and environmental regulations.
 5. Shop drawings:
 - a. Dimensioned 1/4 inch scale drawings, bearing dimensions of actual measurements taken at the project, where practical.
 - b. Include complete fabrication details and erection drawings.
 6. Selection samples:
 - a. Polyvinyl chloride chips indicating Manufacturer's range of colors, transparency, and textures available for initial selection.
 - b. Provide additional samples, of size requested by Architect, to aid in the Architect's selection.
 7. Verification samples:
 - a. 12 inch vane lengths illustrating perforation pattern, material and color.
 - b. 12 inch lengths of headrail with at least two carriers and operating end cap, illustrating materials and selected headrail color.
 8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.

- b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- d. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.

1.6 REGULATORY REQUIREMENTS

- A. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Do not deliver vertical blinds to the project until all concrete, masonry, plaster and other wet work has been completed and is dry.
- C. Deliver vertical blinds to site in labeled protective packages, uniquely identified for each intended location.
- D. Store materials in manner recommended by blinds manufacturer, inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- E. Maintain ambient temperature between 60 and 85 degrees Fahrenheit, and a relative humidity between 20 and 50 percent for a period starting 24 hours before installation of vertical blinds, and maintain until Owner's Final Acceptance.

1.8 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.9 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, deliver to the Owner extra materials for future repairs and maintenance.
 - 1. Furnish 1 percent of each size, type and color of vertical louver blinds specified, but not less than 2 of each type.

2. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 1. Draper Shade and Screen Co., Spiceland IN.
 2. LouverDrape Corporation, Santa Monica, CA.
 3. Carey-McFall Corporation (Bali), Montgomery PA.

2.2 BLIND COMPONENTS

- A. Vanes: 4 inch wide, perforated extruded polyvinyl chloride, nominal 1 percent open, in color selected by the Architect from manufacturer's full range of available colors.
- B. Headrail: Extruded aluminum 6063 alloy T5 temper, having a minimum wall thickness of 0.047 inch, nominally 1-5/16 inches high, of width for manufacturer's standard trucks and specified operation, with capped ends.
- C. Carrier trucks: Delrin stem support with traversing delrin wheels or equal high-strength nylon with ratchet rotation mechanism and field replaceable hook.
- D. Spacer links: Stainless steel, aluminum or delrin spacer/stabilizer links.
- E. Transversing: Continuous polyester transverse cord with rayon core, attached to master carrier. Blinds may transverse left or right direction or may be centered for center drawer.
 1. Cord shall be held down by a spring tensioned pulley.
- F. Rotation: Bi-directional, no-friction beaded chain mechanism, with high-strength glass-fiber-reinforced polyester spur gear and keyed aluminum rod. Control loop chain shall be endless nickel plated bead chain.

2.3 ACCESSORIES

- A. Mounting Brackets: Zinc chromate finished 16 gage steel in manufacturer's standard configuration for head or wall mounting.

2.4 FABRICATION

- A. Fabrication: Fabricate units to completely fill existing openings, from head-to-sill and jamb-to-jamb. Do not commence fabrication of blind units field measurements are confirmed.
- B. Vertical blinds shall hang straight and flat without buckling or distortion.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Ensure that supporting substrate is adequate.
- B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

- A. Install units to comply with manufacturer's instructions for type of mountings and operations required. Provide units plumb and true, securely anchored in place with recommended hardware and accessories to provide smooth, easy operation.

3.3 TOLERANCES

- A. Maximum variation of gap at window opening perimeter: 1/4 inch.
- B. Maximum offset from level: 1/8 inch.

3.4 ADJUSTING

- A. Adjust units for smooth operation. Replace any units or components which do not operate smoothly and without hindrance.

3.5 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section

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Section 12 24 00
WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install the following:
1. Chain driven, manually operated single roller-screens for interior light-filtering shading.
 2. Individually operated, recessed motorized roller-screen system for interior light-filtering shading at Lobby, Piano Lab, Band and Chorus.
 3. Motorized dual roller screen system with light-filtering shading and room-darkening at Cafeteria, Media Center.
 4. Supplementary items required for shade installation.
 - a. Provide shades at all exterior windows except as otherwise specified herein below, refer to plans, interior and exterior elevations for sizes. Field verify all openings.
 - b. Do not provide shades at the following locations:
 - 1) All stairs and vestibules.
 - 2) Locations to receive vertical blinds.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Blocking for window shade systems.

- F. Section 09 29 00 - GYPSUM BOARD:
 - 1. Substrate for window shade systems.
- G. Section 09 51 00 - ACOUSTICAL CEILINGS: Relationship of window shades to acoustical ceilings.
- H. Division 26 - ELECTRICAL: Electrical supply wiring and switches.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section - REFERENCE. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. NFPA 701 - Standard Methods of Fire Tests for Flame-resistance Textiles and Films.
 - 2. NFPA 70 - National Electrical Code.
 - 3. UL 214 - Standard for Tests for Flame Propagation of Fabrics and Films.

1.4 PERFORMANCE REQUIREMENTS

- A. Fire performance characteristics; shade material tested in accordance with NFPA 70 1- Vertical Burn Test, rated "FR".

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 - 1. Product Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions for each item furnished hereunder.
 - a. Provide additional information required for fabric, including: Size limitations, fire resistance information. Identify available shade cloth colors and materials.
 - b. Provide color chips for exposed painted components.
 - c. Note on submittals any deviations from specified requirements and the reasons thereof.
 - 2. Maintenance Information: Fabric maintenance data and recommended cleaning materials, and cleaning and stain removal methods.
 - 3. Warranty: Provide sample copies of manufacturers' actual warranties for all materials to be furnished under this Section, clearly defining all terms, conditions, and time periods for the coverage thereof.
 - 4. Certifications:
 - a. Certify the shade system is fully compatible with the specified electrical design.
 - b. Manufacturer shall submit notarized certificate indicating compliance with requirements of specifications and that specified warranty will be provided without restriction.

- c. Certification of compliance with current building code and environmental regulations: Manufacturer shall certify that materials proposed for use comply with applicable building code and environmental regulations.
 - d. Authorization for Deviations From Specifications: If any deviations from specifications have been accepted, include written description and reasons for deviations. Include authorization for change signed by Owner, Architect, Engineer, and person submitting change. Authorization for change shall also clearly indicate party responsible for remedying defects.
5. Shop drawings:
 - a. Dimensioned 1/4 inch scale drawings, bearing dimensions of actual measurements taken at the project, where practical.
 - b. Include complete fabrication details and erection drawings.
 6. Wiring Diagrams and Schematics: Submit detailed wiring diagrams and schematics of the entire system, and each component of the system with a detailed list of the components, wiring schematics, and operational characteristics at every level of operation.
 7. Selection Samples:
 - a. 3 by 5 inch size shade cloth and liner sample swatches indicating Manufacturer's full range of colors and patterns available for initial selection.
 - b. Provide additional shade cloth and liner samples, of size requested by Architect, to aid in the Architect's selection.
 8. Verification Samples: One fully operational window shade sample, 24 by 24 inches complete with selected shade cloth, liner and hem bar mounted to specified roller mechanism .
 9. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.6 QUALITY ASSURANCE

- A. Obtain shade operators and fabric products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of operator.
- B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.7 QUALIFICATIONS

- A. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Do not deliver shades to the project until all concrete, masonry, plaster and other wet work has been completed and is dry.
- C. Deliver prefabricated shades to site in labeled protective packages, uniquely identified for each intended location. Schedule delivery of panels to prevent delays of the Work, and minimize on-site storage.
- D. Store materials in manner recommended by shade manufacturer, inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.
- E. Maintain ambient temperature between 60 and 85 degrees Fahrenheit, and a relative humidity between 20 and 50 percent for a period starting 24 hours before installation of window shades, and maintain until Owner's Final Acceptance.

1.9 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.11 WARRANTY

- A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- B. Manual operating components: Manufacturer's 10 year warranty from Date of Substantial Completion of shade installation. Warranty shall include provisions that installation shall remain operational without fault and include all operating parts, except for the bead chain which is not warranted.
- C. Motorized components: Manufacturer's 1 year warranty from Date of Substantial Completion of project. Warranty shall include provisions that installation shall

remain operational without fault for the warranty period including coverage of motor, electrical controls and override circuits.

- D. Shade cloth: Manufacturer's 10 year warranty from Date of Substantial Completion of shade installation. Warranty shall include provision that shade cloth will not fade, deteriorate, sag or warp for the warranty period.

1.12 EXTRA MATERIALS

- A. Upon completion of the Work of this Section, under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, deliver to the Owner extra materials for future repairs and maintenance.
 - 1. Furnish 1 percent of each size, type and color of window shades specified, but not less than 2 of each type.
 - 2. Clearly label and package extra materials securely to prevent damage.

PART 2 – PRODUCTS

2.1 MANUFACTURER AND TYPE

- A. Clutch and chain mechanism shade, institutional quality mounted on one-piece roller with end support brackets and bead chain clutch operator. Shades shall be: Draper FlexShade as manufacturer by Draper Shade and Screen Co., Spiceland IN., or equal, as manufactured by one of the following:
 - 1. Draper Shade and Screen Co., Spiceland IN.
 - 2. Levolar Corporation, Sunnyvale CA.
 - 3. MechoShade, Long Island City, NY.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire performance characteristics; shade material tested in accordance with NFPA 70 1- Vertical Burn Test, rated "FR".
- B. Electrical control equipment must be wired in accordance with the shade manufacturer's wiring diagrams and in accordance with the National Electrical Code and local codes.

2.3 MANUFACTURERS AND TYPES

- A. Specified Manufacturer for manual shades: To establish a standard of quality, design and function desired, Drawings and specifications have been based on products from MechoShade, Long Island City, NY as follows:
 - 1. Typical shades: MechoShade, product: "Mecho/5 Shade", manually operated.
- B. Specified Manufacturer for motorized shades: To establish a standard of quality, design and function desired, Drawings and specifications have been based on products from MechoShade, Long Island City, NY as follows:
 - 1. Typical shades: MechoShade, product: "Electro 2", electrically operated.
 - a. Provide with surface mounted brackets.

2.4 SHADE COMPONENTS

- A. Clutch operator: Bi-directional clutch and beaded chain mechanism, fabricated from high-strength glass-fiber -reinforced polyester and high-carbon steel springs. Control loop chain shall endless nickel-plated brass bead chain; plastic bead chain is not acceptable.
1. Furnish flexible offset drive, where required, with universal joint permitting up to 12 degree angle between any two shades with a single operator.
 2. Provide all shades with chain hold down, spring-tension pulley and shock absorber.
- B. Rollers: Removable, 1-1/2 inch or larger diameter, extruded aluminum alloy 6063-T5 or alloy 6063-T6 tube with a minimum wall thickness of 0.065 inch.
1. Shade mounting spline: Extruded vinyl spline, enabling shade cloth to be removed without having to remove the tube from retainer brackets or without removing brackets from wall
 2. Tube Support: Delrin cover plate shall provide protection from tube dislocation. In the event the tube is pushed out of place, the Delrin end of the mounting plates shall contain the tube preventing the tube from falling out of the bracket.
- C. Mounting Brackets: Zinc chromate finished 16 gage steel in manufacturer's standard configuration for head or wall mounting.
- D. Roller idler assembly: Type 6/6 injected molded nylon or high-strength glass-fiber -reinforced polyester outside sleeve, with zinc plated steel pin.
- E. Shade fabrics:
1. Solar/privacy fabric, PVC-Free: MechoShade Ecoveil, 0950 series, fabricated from thermoplastic olefin (TPO) for both core yarn and jacket, woven in a 2 by 2 non-directional basketweave, meeting the following minimal requirements:
 - a. Minimum thickness: 0.030 inch (0.762 mm).
 - b. Flame retardant treated certified in conformance with NFPA 701, UL 214,.
 - c. Maximum open in weave: 1 percent.
 - d. Color: As selected by Architect.
 - e. Fading:
 - 1) UV test 200 sun-fade hours: no change.
 - 2) UV test 500 sun-fade hours: Maximum 5 percent change.
 - f. Seamless up to 126 inch width.
 - g. Hem pocket: Provide hem pocket, heat sealed or sewn with bottom weight enclosed.
 - h. Fabric warranty: Manufacturer's standard 10 year limited warranty.
 2. Fabric for acoustical separation: 100 percent polyester shade cloth as scheduled on the Drawings.
 - a. Basis of Design: MechoShade, Long Island City, NY, product: AcustiVeil™, 0890 Series, Dimout Shadecloth Collection™.

- b. Flame retardant treated certified in conformance with NFPA 701-2004, UL 214.
 - c. Noise reduction coefficient, (NRC): 0.575.
 - d. Openness Factor: 0-1 percent in accordance with ASHRAE 74.
 - e. Average Fabric Thickness: 0.021 inch.
 - f. Average Fabric Weight: 7.6 ounces per square yard.
 - g. Color: As selected by Architect from manufacturer's full available range of options.
 - h. Seamless up to 72 inch width.
 - i. Hem pocket: Provide hem pocket, heat sealed or sewn with bottom weight enclosed.
- F. Recessed housing, for gypsum board ceilings with removable closure plate for access.
- G. Guide cables provide where recommended by manufacturer.

2.5 MANUAL OPERATION

- A. General: Bi-directional clutch and beaded chain mechanism with adjustable brake to permit dynamic mode with predetermined stop positions or, static mode with infinite stop positions.
- 1. Sprocket: One piece injection molded high density Delrin, capable of full engagement with ball chain.
 - 2. Control loop chain shall endless nickel-plated brass bead chain; plastic bead chain is not acceptable.
 - 3. Brake mount: Shake-proof steel and nylon vibration-resistant locking nut to maintain selected braking friction
 - 4. Self-Adjusting linear disc brake (flat steel backing plate is not acceptable as a substitution) with concealed tension adjustment device.
 - a. System shall consist of a compression spring with two friction-absorbing nylon washers on a 1/4" steel shaft which provides continuous uniform compensating brake pressure on the one-piece sprocket brake drive component with a braking surface of not less than 2.89 square inches
 - b. Provide a compression spring which also acts as a vibration absorber.
 - 5. Flexible offset drive, where required, with universal joint permitting up to 12 degree angle between any two shades with a single operator.
 - 6. Provide anchor catch for each chain.

2.6 ELECTRICAL OPERATION

- A. System Description:
- 1. Ultra-quiet, precision-controlled electronic drive unit housed inside roller tube, controlling shade movement.
 - 2. Audible noise: Maximum 44 dBA measured 3 feet from electronic drive unit. No audible clicks when motor starts or stops.

3. Allow for all windows within designated space to be integrated under single gang controls. Work scope includes roller shades, drive units, pockets and fascias, shade controls, and power supplies.
 4. Control shade speed for tracking within plus or minus 0.0625 inch throughout entire travel.
 5. Include 10 year power failure memory for preset stops, open and close limits, shade grouping and subgrouping, and system configuration.
 6. Systems with multiple electronic drive units electronically synchronized to start, stop, and move in unison.
- B. Grouping:
1. Keypads and contact closure inputs can control any electronic drive unit without separate group controller.
 2. System groups and subgroups configured at point of control without rewiring and without access to electronic drive unit.
 3. System may contain multiple electronic drive units.
 4. Keypads and interfaces able to operate any group or subgroup of electronic drive units.
- C. System Controls:
1. Shades controlled by built-in shade columns on lighting control or by keypad.
 2. Electronic drive units, keypads, and lighting controls contain microprocessors, allowing high level programming from any source.
 3. System devices, including shades and lighting controls, connected through common communication link.
- D. System Performance:
1. One-touch control of shades by means of any combination of the following, keypad, lighting control, or infrared remote, as determined by Architect during shop drawing phase.
 - a. Black out shades shall be controlled by switch only.
 2. Capable of stopping within accuracy of 0.125 inch at any point between open and close limits.
 3. Store over 250 programmable stop points, including open, close, and any other position.
 4. Presets set by 5-second button push and hold from keypad, lighting control, or handheld remote control.
 5. Presets recalled by keypad, contact closure input, infrared receiver, or other lighting control system interface.
 6. Open and close limits programmable from electronic drive unit, lighting control, wall-mounted keypad, or handheld remote control.
 7. System components electro static discharge protected.
- E. Master Control Systems:
1. Primary control of shades shall be equal to MechoShade "Multi-Zone Controller" for sun activated, temperature or pre-programmed timer activated controls and automatic adjustment of shade positions. System shall be

- capable of controlling all zones individually or collectively through four low voltage control wires as indicated in electrical drawings.
2. Each zone shall be capable of being operated by a momentary double-pole, double-throw switch located remotely, overriding automatic controls.
 3. Master Controller Hardware:
 - a. Standard IBM XT or AT compatible computer equipped with all necessary interfacing hardware to accept the following inputs:
 - 1) Analog inputs for photocells (solar level detection).
 - 2) Digital inputs for building computer priority commands.
 - 3) Inputs for fire alarm and additional non-designated ports.
 - 4) Cable: 4-wire shielded communication cable.
 4. Master Controller Software; shall be capable of providing following functions for each individual zone. These functions must be capable of adjustment or definition by the user through menu driven screens and keyboard, without the need of computer programming knowledge.
 - a. Independently addressable zones.
 - b. User defined shade increment; (up to 10 increments) where increment number zero will represent the fully up position.
 - c. User defined tables which shall correspond to a range of dates and times and shade positions.
 - 1) Each table shall have a user definable set of [solar level] [temperature] [wind speed] conditions, which shall define distinct weather and sun conditions and direct the shades to a specified position.
 - d. User defined priority command positions in case of emergency alarm conditions relayed from other interacting computer systems.
 - e. User defined time of day at which Sub-Master and Local controls which have been locally accessed are returned to master control.
 - f. Display of zone status, along with solar intensity levels and indoor and outdoor temperatures.
 - g. The control system shall be capable of staggering the operation of shade motors to assure balanced loading of the electrical system.
 5. Sub-Master:
 - a. Each Sub-Master shall be intelligent and shall decode signals from, and respond interactively with the master.
 - b. Each Sub-Master shall handle up to eight zones as needed.
 - c. Each Sub-Master shall provide local switching by zone and shall be excluded from normal automatic commands by the master. High priority commands shall override this local status.
 6. Motor Logic Controller (MLC):
 - a. The Motor Logic Controller shall provide an interface for up to four shade motors in a zone on a floor of the building. Multiple Motor Logic Controllers may be ganged to handle zones with more than four motors.
 - b. In the event of a zone on a floor of the building where more than one Motor Logic Controller are ganged (more than 4 motors), one shall be a master and the rest slave Motor Logic Controllers.
-

- c. The Motor Logic Controller shall have the capability of accepting a piggy-back unit to provide local switching of predetermined groups of motors within a zone.

2.7 MOUNTING SYSTEM

- A. Mounting: Wall, jamb, or overhead mounted as indicated, brackets made of 1/8 inch sheet steel to which drive assembly, idle end assembly and center support systems are attached.
 - 1. Furnish center support brackets to meet span or weight requirements.
 - 2. Components of brackets shall be interchangeable or replaced without removing bracket from wall or ceiling, inside or outside mount.
 - 3. Metal support brackets cadmium plated steel. Custom color as selected by the Architect.

2.8 ACCESSORIES

- A. Fascia: One-piece extruded aluminum 6063-T5 alloy with average thickness of 0.062 inches, snap-loc clipped to the brackets without the use of glue, magnetic strip or screws, concealed fastening.
 - 1. Offset Drive - No Notch Fascia: Chain drive shall fall behind the return edge of the fascia without notching or otherwise defacing the return leg of the fascia. Fascia shall return not less than 1-1/2" from the front of the hardware fully concealing the roll and the tube, M III wide and 1-1/4" M III narrow.
 - 2. Fascia filler; readily removable to bridge mullions, transition piece between shades in same material and finish as fascia panel.
- B. Guide cables provide where recommended by manufacturer.

2.9 FABRICATION

- A. Fabrication: Fabricate units to completely fill existing openings, from head-to-sill and jamb-to-jamb. Do not commence fabrication of shade units until field measurements are confirmed.
- B. Fabric shall hang straight and flat without buckling or distortion. Fabric edges shall be straight and without ravel.

2.10 FACTORY FINISHES

- A. Steel parts, cadmium plated, satin finished, or bonderized prior to painting with baked enamel finish.
 - 1. Colors as selected by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Ensure that supporting substrate is adequate.
- B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

- A. Install units to comply with manufacturer's instructions for type of mountings and operations required. Provide units plumb and true, securely anchored in place with recommended hardware and accessories to provide smooth, easy operation.

3.3 TOLERANCES

- A. Maximum variation of gap at window opening perimeter: 1/4 inch.
- B. Maximum offset from level: 1/8 inch.

3.4 ADJUSTING

- A. Adjust units for smooth operation. Replace any units or components which do not operate smoothly and without hindrance.

3.5 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.

End Of Section

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Section 12 30 00
CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies all work and materials for classroom casework of types and sizes shown on the Drawings, as specified herein. The types of work of this section includes, but is not limited to:
 - 1. Plastic laminate clad base and wall cabinets including filler panels and other accessories as needed for a complete and proper installation.
 - 2. Plastic laminate countertops and splashes, for all casework provided under this Section 12 30 00.
 - a. Provide back and side splashes at countertops abutting wall construction and return to edge of countertop at all conditions.
 - b. Provide side splashes where countertops abut tall cabinets.
 - c. Provide PVC edge banding at all plastic laminate countertops unless otherwise indicated.
 - 3. Pencil grilles.
- B. Make all cutouts within casework items as required to accommodate sinks, piping, conduit, and other mechanical and electrical work, from templates provided by the respective mechanical and electrical trades.
- C. Furnish and provide all materials and services as may be additional or separately described under other Sections of this Specification.
 - 1. No attempt is made in this Section to list all elements of casework required on this project or to describe how each element will be installed. It is the responsibility of the Construction Manager to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.
- D. Remove all debris, dirt and rubbish accumulated as a result of this installation, and leave the premises clean and ready for use. This shall include cleaning equipment interiors, exteriors, and worktops.
- E. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - Alternates for the list and description of Alternates.

1.2 RELATED WORK

- A. Section 01 43 39 - MOCKUPS: Requirements for typical classroom mock-up assembly requiring work of this Section.
- B. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- D. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- E. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- F. Section 06 10 00 – ROUGH CARPENTRY: In wall wood blocking supporting casework installation.
- G. Section 06 40 00 - ARCHITECTURAL WOODWORK: Custom millwork and related countertops
- H. Section 07 92 00 – JOINT SEALANTS: Sealant.
- I. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES: Vinyl base installed in toe space.
- J. Section 12 35 53 – LABORATORY CASEWORK: Manufactured laboratory casework, epoxy resin tops.
- K. Division 22 - PLUMBING:
 - 1. Connections to all plumbing work furnished under this Section.
- L. Division 23 - HEATING, VENTILATING, AND AIR CONDITIONING: Return air ductwork and finned tube radiation.
- M. Division 26 - ELECTRICAL: All electrical work related to items in this Section

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - References. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 209 - Test Methods for Cellulosic Fiber Insulating Board.
 - 2. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 3. ASTM D 523 - Standard Specification for Specular Gloss.
 - 4. ASTM D 1037 - Test Methods of Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

5. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
6. AWI (Architectural Woodwork Institute) Architectural Woodwork Standards.
7. APA Grades and Specifications.
8. National Lumber Grades Authority, American Lumber Standards, and Grading Rules and Standards of the various lumber associations whose species are being used, with grade-marks for same.
9. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber; and Product Standard (PS):
 - a. PS-1 - Construction and Industrial Plywood Standard.
 - b. PS-20 - American Softwood Lumber Standard.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
 2. Materials schedule: A complete schedule of casework components, coordinated with the Contract Drawings.
 3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
 4. Selection samples:
 - a. Plastic laminate chips for initial color selection by Architect.
 - b. Chain of PVC edging materials.
 - c. Sealant material: Manufacturer's standard strips of sealant, in all available colors, for selections by the Architect.
 - d. Provide additional samples as requested by Architect for initial selection of material colors and finishes.
 5. Verification samples:
 - a. Complete sample base cabinet unit, 24 inches wide, with countertop and at least one door with specified hardware including lock, and one drawer with specified hardware and slide. Sample shall show full construction of all joints in casework and sample joint in worktop. Reviewed and accepted sample will be used for the purpose for establishing a quality control standard, and may not be incorporated into the work.
 - b. Sample of each type of hardware in specified finish.
 6. Test data on chemical resistance of plastic laminate.
 7. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required

following initial Green Building Certification Institute (GBCI) review of LEED Application.

- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- g. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.

1.5 QUALITY ASSURANCE

A. Certifications:

1. All wood products furnished under this Specification Section shall be “FSC Certified” according to the rules of the Forest Stewardship Council (FSC).
 - a. FSC Certification includes the following certification bodies of forests and forest products:
 - 1) SCS Global Services.
 - 2) SmartWood.
 - 3) SGS Qualifor.
 - 4) Soil Association.

B. Joinery: All joinery work performed under this Section shall be of Premium Quality Grade, as defined in the current edition, of the AWI (Architectural Woodwork Institute) Architectural Woodwork Standards.

1. Heat resistance: Hot water (190 degrees-205 degrees) shall be allowed to trickle onto the surface, which shall be set at an angle of 45 degrees from horizontal for a period of 5 minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water.
2. Moisture resistance: A cellulose sponge (2 inches by 3 inches by 1 inch) shall be soaked with water and place on the surface of the finish for a period of 100

hours. The sponge shall be maintained in a wet condition throughout duration of tests. At the end of the test, the surface shall be dried and upon examination, shall show no blushing or whitening of the finish.

3. Impact resistance: A one pound steel ball (approximately 2 inches in diameter) shall be dropped for a distance of one foot onto the finished surface of a 1/4" thick plywood panel supported underneath by solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close examination.

1.6 FIELD MEASUREMENTS

- A. Field dimensions: The casework vendor is responsible for details and dimensions not controlled by Project conditions and shall show on his shop drawings all required field measurements beyond his control.
 1. The Construction Manager shall acknowledge the casework vendor's need for accurate field dimensions prior to custom fabrication.
 2. The Construction Manager and the casework vendor's shall cooperate to establish and maintain these field dimensions.
 3. The casework vendor shall verify confirm all dimensions at the Project site relative to casework, all, and bring any significant discrepancies to the attention of the Architect prior to casework fabrication.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.8 PRODUCT HANDLING

- A. Delivery and Storage: Deliver materials under protective cover and store within dry enclosed space.
- B. Protection: Use all means necessary to protect materials of this Section during transition, before, during, and after installation and to protect installed work and materials of all other trades.
 1. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes.
 2. Do not deliver casework to site until all concrete, masonry work is dry. Do not begin installation until veneer plaster has fully cured and is dry.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, at no change in Contract Sum.

1.9 WARRANTY

- A. Provide manufacturer's two year warranty against all defects in material or workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Case Systems production line modular casework. Moderate and reasonable variations of manufacturer or products of other manufacturers will be considered, upon Architect's approval.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Casework:
 - a. Case Systems, Midland, MI.
 - b. LSI Corporation of America, Minneapolis, MN.
 - c. TMI Systems Design Corporation, Dickinson, ND
 - 2. Plastic laminate countertops:
 - a. Formica Corp., Cincinnati, OH.
 - b. Pioneer Plastics Corp. (Pionite), Auburn ME.
 - c. Nevamar Corp., Odenton MD.
 - d. Ralph Wilson Plastics Co. (Wilsonart), Temple TX.
 - e. Aborite Corporation, Quebec Canada.

2.2 CASEWORK MATERIALS

- A. Wood materials:
 - 1. General Requirements: In general, all materials shall be the best of their respective kinds for the purpose intended and all methods used in construction shall conform to best practices including any specialized materials required.
 - a. Woods Used: All woods shall be carefully and thoroughly air-dried, then kiln dried by the laboratory equipment manufacturer in his own humidity controlled kilns to a moisture content of 4-1/2%. All kiln dried lumber shall then be tempered to a moisture content of 6% before use. This moisture content shall be maintained throughout production.
 - 2. Sustainable Forest Certification: All wood shall be "Chain-of-Custody" certified as FSC Certified.
- B. Cabinetry case body, and countertops without sinks: Mattformed three layer medium density wood particle panel (PB), graded M2 per ANSI A 208.1 with a minimum density of 48 pounds per cubic foot or equivalent hardwood plugged plywood complying with PS 51-71.
 - 1. "FSC": Provide board which is comprised of 75 percent FSC certified wood equal to the following;
 - a. Collins Pine Company (distributed through Panel Source International, Tacoma WA.), product: "FSC Certified Particleboard"
 - 2. Thicknesses:
 - a. 3/4 inch thick at cases.

- b. 1 1/8 inch thick at counters without sinks.
- C. Casework end panels which extend to floor, and all countertops with sinks and similar wet conditions: Moisture resistant medium density fiberboard (MDF) conforming to ANSI A208.2 product class MD, fabricated from 100 percent pre-consumer recycled fiber, using formaldehyde free polyurethane/synthetic resin such as methyl diisocyanate (MDI) or (pMDI), having a minimum density of 44 pounds per cubic foot.
 - 1. Acceptable products include the following or approved equal:
 - a. SierrPine Inc., Moncure, NC, product "Medex".
 - 2. Thicknesses:
 - a. Typical: 3/4 inch thick panels, except as otherwise indicated.
- D. Drawers and doors: Minimum 3/4 inch thick particleboard.
 - 1. Thicknesses:
 - a. 3/4 inch thick panels, except as otherwise indicated or specified.
 - b. Doors over 36 inches tall: provide 1-1/4 inch thick panels.
- E. Plastic laminate: General purpose, conforming to NEMA LD3.1 -1991 Grade GP48, nominal 0.048 inch thickness, in a low non-directional texture in color and price group selected by the Architect.
 - 1. Manufacturers and laminate colors/patterns: As indicated on Drawings or as otherwise selected by Architect.
- F. Edge banding: PVC applied utilizing hot melt adhesive and radiused by automatic trimmers. Edging shall be in color selected by the Architect.
- G. Adhesives: Zero VOC, PVA adhesive with no added urea formaldehyde, mechanically applied.
- H. Plastic laminate for casework, doors and drawers interior and exterior surfaces: GP28 vertical surface grade high-pressure laminate. Color as selected from casework manufacturer's full range of available colors.
 - 1. Plastic laminate, unfinished balancing (backer) sheet, conforming to NEMA LD3-1985 undecorated laminate, Grade BK20, 0.020 inch nominal thickness.

2.3 CASEWORK CONSTRUCTION, GENERAL

- A. All exposed edges including toe kick shall be edge banded. No exposed edges will be permitted.
- B. Cabinet box style shall be reveal overlay construction.
- C. All panels shall be manufactured with balanced construction.
- D. Fixed interior components including shelves, dividers, and compartments shall be full 3/4 inch thick and attached with concealed interlocking mechanical fasteners.
- E. Cabinet body front edge shall be manufacturer's standard 0.020 inch thick PVC.

- F. Mounting stretchers are $\frac{3}{4}$ inch thick structural components fastened to end panels and back by mechanical fasteners, and are concealed by the cabinet back.
- G. When the rear of a cabinet is exposed, a separate finished $\frac{3}{4}$ inch thick decorative laminate back panel shall be required.
- H. Backs of cabinets shall be $\frac{1}{2}$ inch thick and surfaced on both sides for balanced construction and fully captured on both sides and bottom.
- H. Shelf clips: Transparent plastic clips for plastic laminate shelves, equal to Hafele model No. 282.27.402 or approved equal.
- I. An upper $\frac{3}{4}$ inch thick stretcher shall be located behind the back panel and attached between the end panels with mechanical fasteners. Attach to the full sub-top capturing back panel.

2.4 BASE CABINET CONSTRUCTION:

- A. All base cabinets, except sink cabinets, shall have a solid $\frac{3}{4}$ inch thick sub-top of core material as specified and fastened between the ends with interlocking mechanical fasteners.
- B. Sink cabinets with a split removable back panel shall have a formed metal front brace, and steel corner gussets shall be utilized to support and securely fasten top in all four corners. Front brace shall be concealed and powder coated black.
- C. Provide separate ladder style base, scribed to floor and walls prior to cabinet installation.
- D. Individual bases shall be constructed of pressure treated plywood factory applied to base and tall cabinets and shall support and carry the load of the end panels, and the cabinet bottom, directly to the floor. The base shall be let in from the sides and back of the cabinet to allow cabinets to be installed tightly together and tight against a wall, also to conceal the top edge of applied vinyl base molding (not supplied by casework manufacturer). There shall be a front to back center support for all bases over 30 inches wide.

2.5 TALL CABINETS:

- A. All tall cabinets shall be provided with an intermediate fixed shelf to maintain internal dimensional stability under heavy loading conditions as well as an intermediate $\frac{3}{4}$ inch thick stretcher located behind the back panel and be secured between the cabinet ends with mechanical fasteners. The stretcher shall be secured to the shelf through the back with #8 by 2 inch plated flat head screws.
- B. Individual bases shall be constructed of pressure treated plywood factory applied to base and tall cabinets and shall support and carry the load of the end panels, and the cabinet bottom, directly to the floor. The base shall be let in from the sides and back of the cabinet to allow cabinets to be installed tightly together and tight against a wall, also to conceal the top edge of applied vinyl base molding (not supplied by casework manufacturer). There shall be a front to back center support for all bases over 30 inches wide.

2.6 WALL CABINETS:

- A. All wall cabinet bottoms shall be 1-inch thick core as specified, mechanically fastened between end panels and secured to the bottom back stretcher. A lower $\frac{3}{4}$ inch thick stretcher shall be located behind the back panel and attached between the end panels with mechanical fasteners. The stretcher is also secured through the back and into the cabinet bottom.
- B. All wall cabinet exterior bottoms shall match exterior surface of cabinets.
- C. Tall and wall cabinet top edges shall be finished with 0.020 inch PVC.

2.7 DRAWER FRONTS AND SOLID DOORS:

- A. Door and drawer front edge shall be manufacturer's standard: 3mm PVC.

2.8 DRAWERS:

- A. Drawer sides and backs: Dovetail construction, 1/2 inch thick solid hardwood of specified species.
- B. Laminated drawer fronts: High density laminate over 3/4 inch specified core material. Drawer fronts shall be applied to separate drawer body component sub-front.
- C. Drawer box shall be the maximum height that allows for proper operation of drawer and hardware
- D. Bottom: Nominal 1/2 inch with stiffeners, (1) at 24 inches, (2) at 36 inches and (3) at 48 inches MDF board with laminate face, inset into all four sides of drawer box and sealed with hot melt glue process around entire drawer bottom perimeter.
 - 1. Reinforce drawer bottoms as required with intermediate spreaders.
- E. Door and removable drawer front: $\frac{3}{4}$ inch particleboard core with GP28 vertical surface grade high-pressure laminate, 3mm PVC banding.
- F. Finish: Provide drawer boxes with manufacturer's standard clear finish.

2.9 DOORS:

- A. Solid Doors shall be $\frac{3}{4}$ inch thick or 1 inch thick core as specified herein.

2.10 SHELVES:

- A. Adjustable:
 - 1. Adjustable shelves in closed cabinets shall be $\frac{3}{4}$ inch thick except 1 inch for shelves over 30 inches wide and open cabinets.
 - 2. Adjustable shelf shall be set back 15mm from front or 23mm when locks are used.
- B. Fixed:
 - 1. Fixed shelves shall be shall be $\frac{3}{4}$ inch thick except 1 inch for shelves over 30 inches wide and open cabinets.

2.11 PLASTIC LAMINATED COUNTERTOPS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Ralph Wilson Plastics Co. (Wilsonart), Temple TX.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Ralph Wilson Plastics Co. (Wilsonart), Temple TX.
 - 2. Formica Corp., Cincinnati, OH.
 - 3. Laminart, Elk Grove Village, IL.
 - 4. Pioneer Plastics Corp. (Pionite), Auburn ME.
 - 5. Nevamar Corp., Odenton MD.
 - 6. Aborite Corporation, Quebec Canada.
- C. Plastic laminate, general purpose, conforming to NEMA LD3.1 -1991 Grade GP50, nominal 0.050 inch thickness, in a low non-directional texture in color price group selected by the Architect.
 - 1. Manufacturers and laminate colors/patterns: As indicated on Drawings or as otherwise selected by Architect.
- D. Counter front edge shall be manufacturer's standard 3 mm PVC, color as selected by Architect.
- E. Adhesive for installation of plastic laminate: Rigid bond polyvinyl acetate (PVA) type only. Contact cements are only permitted at countertops with sinks or similar "wet condition" areas.

2.12 GRILLES

- A. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Metalaire, Clearwater, FL, product: "Series 2000 Linear Bar Grilles".
 - 2. Airflex Industrial Corp, Farmingdale, NY, product: "#2004 Bar Grilles".
 - 3. Register & Grille Mfg. Co., Inc, Brooklyn, NY, product: "#EP25SE10 Flange Grille".
 - 4. Dayus Register & Grille, Windsor ON, Canada, product: "DABL" Bar Linear Grilles.
- B. Construction: Extruded aluminum face bars in ½" centers parallel to the long dimension; 0 degree deflection; 1-inch nominal frame border with countersunk face screw mounting holes; stainless steel square drive screw fasteners. Provide aligning pins to join multiple sections together for continuous appearance.

2.13 HARDWARE

- A. Hinges:

1. Heavy-duty five (5) knuckle hinges of all-metal construction, permitting 165 degree swing; accommodate door thicknesses specified. Fully adjustable for clockwise, counter-clockwise, toe in and out door alignment.
 2. Base plates for maintaining 1/8" reveals between door/drawers within the same cabinet, and between doors of adjoining cabinets.
 3. One pair of hinges per door to 48 inch height. One and one-half pair of hinges per door over 48 inches in height.
 4. Hinge mounting: Flathead screws so applied to door and cabinet as to withstand a weight load of 150 pounds minimum.
- B. Pulls: Offset type staple-shape wire pull, 4 inches long, 3/8 inch diameter, clear anodized aluminum with brushed finish, with one-inch finger clearance.
- C. Drawer slides:
1. For extra heavy loads including file drawers: Full extension type, 200 pounds per pair minimum rated capacity, steel ball bearing rollers, drawer hold in feature.
 - a. Acceptable slides: Accuride N°. 3640A or approved equal.
 - b. Finish: clear lacquered zinc.
 2. For heavy loads: Full extension type, 150 pounds per pair minimum rated capacity (for drawers over 30 inches, provide 175 pounds rated capacity), steel ball bearing rollers, drawer hold in feature.
 - a. Acceptable slides, include the following, or approved equal:
 - 1) For drawers up to 24 inches wide:
 - a) Accuride N°. 4032.
 - b) Knape and Vogt N°. 8500.
 - c) Häfele N°. 4034.
 - 2) For drawers over 24 inches and up to 30 inches wide:
 - a) Accuride N°. 4032.
 - b) Knape and Vogt N°. 8500.
 - c) Häfele N°. No equal.
 - 3) For drawers over 30 inches wide:
 - a) Accuride N°. 4437.
 - b) Knape and Vogt N°. 8520.
 - c) Häfele N°. No equal.
 - b. Finish: Clear lacquered zinc.
 3. For desk and casework drawers: Full extension type, 100 pounds per pair minimum rated capacity, steel ball bearing rollers, lever disconnect, drawer hold in detent feature.
 - a. Acceptable slides, include the following, or approved equal:
 - 1) Accuride N°. 7432.
 - 2) Knape and Vogt N°. 8400.
 - 3) Häfele N°. 3832.
 - b. Finish: Clear lacquered zinc.
- D. Catches:

1. Base and wall cabinets: Spring-tension nylon roller catch with steel strike plate; one catch for each door required at double doors without locks.
 2. Tall cases: One pair of heavy-duty spring tension rubber roller catches for each door; positive catch and lower type latch installed on left hand door.
- E. Locks: Heavy duty, cylinder-type lock with disc tumblers. Positive tumbler operations shall be accomplished by cam action without the aid of springs.
1. Locations: All drawers and hinged doors on casework
 2. Keying: All casework locks keyed alike within each room; Masterkey all casework in Project. No two rooms shall be keyed alike unless otherwise directed by Owner's Representative. Provide 4 keys for each room, and 6 masterkeys (total).
 - a. The lock system shall guarantee security which restricts the duplicating of keys to registered locksmiths.
 3. Strike plates: Finish 26D.
- F. Shelf Clips: Transparent plastic clips for plastic laminate shelves, equal to Hafele model No. 282.47.402, seismic rated.
- G. Number Plates: None Required.
- H. Label holders: Manufacturer's standard in specified finish.
- I. Leveling Devices:
1. Provide leveling devices at all open frame tables adaptable to table legs.
 2. Device construction: 1/2 inch diameter bolt threaded through a 1/2 inch tee nut securely screwed to bottom of leg, or to 1-5/8 inch U-shaped 12 gauge metal bracket with leveling bolts mounted at the four bottom corners of a base cabinet.
 3. Bolts: cadmium plated steel with a hexagonal head to provide bearing against a 12 gauge flat steel floor plate, installed so as to be accessible for adjustment through cupboard bottoms and drawer openings when installed on base cabinets.
- J. Tote Trays: Molded one-piece high-impact polystyrene plastic with all top edges turned down. Trays shall be furnished with label holders and in the sizes specified. Trays shall be as manufactured by Fabri-Form of Indiana, or equal.
1. Size: 16 inches wide by 12 inches deep by 3 inches high, refer to Drawings for quantities.
- K. Install hardware uniformly and precisely after final finishing is complete. Set hinges snug and flat in mortises for leaf concealment. Turn screws to flat seat. Adjust and align hardware so that moving parts operate freely and contact points meet accurately. Allow for final field adjustment after installation.
- L. Grilles:
1. Construction: Extruded aluminum face bars on 1/2 inch centers parallel to the long dimension; 0 degree deflection; 1 inch nominal frame border with countersunk face screw mounting holes; stainless steel square drive screw

fasteners. Provide aligning pins to join multiple sections together for continuous appearance.

2. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - a. Metalaire, Clearwater, FL, product: "Series 2000 Linear Bar Grilles".
 - b. Airflex Industrial Corp, Farmingdale, NY, product: "#2004 Bar Grilles".
 - c. Register & Grille Mfg. Co., Inc., Brooklyn, NY, product: "#EP25SE10 Flange Grille".
 - d. Dayus Register & Grille, Windsor ON, Canada, product: "DABL" Bar Linear Grilles.

M. Hardware Finish: Satin finish stainless steel US32D, unless otherwise noted.

2.14 FABRICATION OF PLASTIC LAMINATE CLAD ITEMS

- A. Except as otherwise specified hereunder, fabricate plastic laminate clad items in strict accordance with the details on the Drawings, the approved shop drawings, and workmanship standards set forth in the current AWI Quality Standards, Custom Grade.
- B. Shop fabricate all plastic laminate clad items. Adhere plastic laminate to particle board backing sheets by cold-press-method. Use of contact cements are not permitted, except at wet areas. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Apply laminate backing sheet to reverse side of tops.
- C. Fit corners and joints hairline. Make all joints and miters tight, secure with concealed fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Erect casework straight, level and plumb and securely anchor in place. Scribe and closely fit to adjacent work. Cut and fit work around pipes, ducts, etc.
- B. Casework shall be installed plumb, level, true and straight without distortions
 1. Use concealed shims as required
 2. Work shall be installed to a tolerance of 1/8 inch in 8 feet for plumb and levelness, including tops.
 3. There shall be no variations in flushness of adjoining surfaces.
 4. Supplemental reinforcing such as steel angles or other framing, blocking or supports shall be fully concealed.
- C. Secure casework to anchors or built-in blocking or blocking directly attached to substrates.
 1. Secure casework to grounds, furring, stripping and blocking as required with countersunk, concealed fasteners performing a complete installation.

- D. Install countertops and sinks in accordance with manufacturers' instructions; set plumb, square and true, securely anchored to cabinet framing or supporting legs as appropriate
- E. Install all items complete and adjust all moving parts to operate properly.
- F. Leave surface clean and free from defects at time of final acceptance.

3.2 TOLERANCES

- A. Maximum variation from true position 1/16 inch with a maximum of 1/32 inch offset from true alignment with adjoining surfaces intended to be flush.

3.3 ADJUSTING

- A. To whatever extent work was not completed at shop or prior to installation of casework, perform and complete the specified finishing of casework.
- B. Repair damaged and defective casework where possible eliminating defects functionally and visually.
 - 1. Where not possible to repair damaged or defective work, replace with matching new work.
 - 2. Adjust joinery for uniform appearance.
- C. Adjust doors and drawers for smooth and balanced movement, lubricate hardware for use.

3.4 CLEANING

- A. Clean Up: Remove all cartons, debris, sawdust, scraps, etc., and leave spaces clean and all casework ready for Owner's use. Vacuum inside of all cabinets, drawers and shelves.

3.5 PROTECTION

- A. Protect all casework with heavy cardboard or similar material until direct by Construction Manager to remove the same.

End of Section

Section 12 35 51

MUSICAL INSTRUMENT AND UNIFORM STORAGE CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install modular music instrument and uniform storage cabinets and music library storage units.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Music education system of storage cabinets will be specifically designed and engineered for the intended use and will meet the minimum performance characteristics specified herein. Music instrument storage units will be chip and abrasion resistant under normal usage and will protect instruments and cases from damage under normal use.
 - 2. Provide one-piece high molecular polyethylene instrument storage shelving with integral ventilation grooves, designed and engineered to withstand continuous use without surface or front edge breakdown.
 - 3. Individual instrument storage cabinets will be manufactured with thermofused polyester laminated panels, finish both faces all components. All end panels to be factory jiggged and drilled to accept unit-to-unit through-bolting: no conventional wood screws attaching units side-to-side will be permitted. Each instrument storage cabinet will be furnished with an integral base and four (4) steel levelers accessible from within the unit but concealed in final installation. These features combine to provide modularity, on-site rearrangement or future relocation of any music education storage cabinet.
 - 4. Provide full cabinet height solid door panels. All hinges shall be structurally attached to vertical panels using engineered and tested through-bolt hardware, and either welded to wire grille doors or through-bolted to solid door leaf; screw mounted hinges will not be permitted.

- B. Manufacturer to provide documentation of following minimum performance requirements:
1. Molded plastic instrument storage shelf shall have a static load capacity of over 1,000 lbs.
 2. Full height solid hinged door for instrument storage units will support a minimum dynamic live load of 315 lbs., applied at outer edge.
 3. Wire grille door hinge to be welded to door frame in five places, pull-tested to withstand 3,000 lbs.
 4. Instrument storage shelf system shall have a factory warranty of ten (10) years against defects in material and/or workmanship.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Product Data: Submit applicable reference standards, performance and test data, and application recommendations and limitations.
 2. Shop Drawings: Submit design and installation drawings showing product components in assembly with adjacent materials and products.
 3. Quality Control Submittals:
 - a. Manufacturer's Installation Instructions.
 4. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
 - d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.

- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
 - g. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.
 - B. Submit manufacturer's warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.
- 1.5 QUALITY ASSURANCE
 - A. Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum board.
- 1.6 DELIVERY, STORAGE AND HANDLING
 - A. Pack and ship to avoid damage according to manufacturer's recommendations:
 - 1. Finish and assemble components in factory before shipment.
 - 2. Ship components in individual, sealed, labeled cartons.
 - 3. Deliver components to room designated for installation.
 - B. Do not accept or install damaged products at the site.
 - C. Store products in heated indoor storage near point of installation. Retain protective packaging until installing.
- 1.7 PROJECT CONDITIONS
 - A. Environmental Requirements: Do not install cabinets until all mortar, wet and dust producing work is completed.
 - B. Field Measurements: Obtain required field measurements from the Construction Manager and indicate on Shop Drawings.
- 1.8 WARRANTY
 - A. Provide manufacturer's written warranty that products not in accordance with requirements of Contract Documents within three years after commencement of warranties shall be corrected promptly after receipt of written notice from Owner. Cabinet shelf will be warranted for ten years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Wenger Corporation, Owatonna, MN 55060, Product: "Instrument Storage Cabinets".

2.2 MATERIALS

- A. Cabinet Wall Panels: 3/4 inch thick industrial (cabinet) grade particleboard, minimum 48 pcf with thermoset polyester (melamine not acceptable) laminate on both sides for totally finished construction. No backer sheets or unfinished surfaces may be used on unexposed sides. Color: As selected by Architect from manufacturer's full line of available colors.
- B. Cabinet Shelving:
1. Cabinets up to 27 inches wide: One-piece high molecular blow-molded polyethylene with 1-3/8 inch radius front edge (Patented). Mount to cabinet walls with one-piece molded rigid nylon clip. Shelf is replaceable without damage to adjacent surfaces. Doweled shelves will not be permitted.
 2. Cabinets over 27 inches wide: One-piece high molecular formed polyethylene with radius front edge and 3/16 inch wall thickness. Ribbed for structural integrity. Supported by four structural tubular members 1-1/2 by 1 inch by 16 gage wall thickness with 14 gauge welded end plates.
- C. Doors:
1. Doors: Full-height cabinet size, manufacturer's standard straight grille construction with powder paint finish in color selected by the Architect from manufacturer's full line of standard colors.
 2. Hinges: 5-knuckle institutional type hinge. Hinge shall support 315 pounds of dynamic vertical loading. Hinge pin shall be 2-3/4 inches long. Weld hinge to door frames in five places. Fastened to cabinet with through bolt construction; attachment by wood screws not acceptable. Provide four hinges on full height doors.
 3. Locking slide-bolt: All doors shall be factory provided with locking slide-bolt designed for padlocks, with formed steel strike plate through-bolt connected to cabinet end panel; 12 gauge steel. Provide clear plastic label holder for identification card insert.
 4. Finish: Provide powder paint finish in color selected by the Architect from manufacturer's full line of standard colors.
- D. Edging: Heat bonded 3mm beveled PVC edge-banding, machine applied using hot-melt adhesives, edges and corners machine profiled for safety, integral color: As selected by Architect from manufacturer's full line of available colors.
- E. Finish Hardware:
1. Joinery Hardware: two inch, 1/4-20 panel connectors with 15mm head diameter, and steel thread inserts shall be utilized to join desired cabinets side-to-side; use factory jigged and drilled joinery holes. Finish: Powder paint coating, color: As selected by Architect from manufacturer's full line of available colors.
 2. Cabinet levelers: Structural levelers each cabinet, accessible from within the unit when desired, concealed in complete installation; glides with minimum 3/8 inch diameter threaded rod mounted in steel corner brackets. Provide minimum four glides per cabinet, six glides for cabinets with divider panels.
- F. Cabinet Back Panel:

1. Standard cabinet back to be 1/4 inch thick prefinished hardboard, color: As selected by Architect from manufacturer's full line of available colors.

- G. Fabricate and package all components in the factory and ship fully assembled or ready to assemble.

2.3 ACCESSORIES

- A. Vertical Closure Kit: Provide visual closure between wall and cabinet. Constructed of 3/4 inch thick thermoset polyester composite wood to match cabinet side panels. Colors: As selected by Architect from manufacturer's full line of available colors. Will fit 3/4 inch to 30 inch wide opening.
- B. Horizontal Closure Kit: Provide visual closure between top of cabinet and soffit. Constructed of 3/4 inch thick thermoset polyester composite wood to match cabinet side panels. Color: As selected by Architect from manufacturer's full line of available colors. Will fit 3/4 inch to 30 inch high opening.
- C. Top Back Filler Kit: Provide visual closure between back wall and top panel of cabinet. Constructed of 3/4 inch thick thermoset polyester composite wood to match cabinet top panels. Color: As selected by Architect from manufacturer's full line of available colors. Will fit 10 inch and 20 inch deep openings.
- D. Finished Back Panel: Provide panel to attach to cabinet back that is exposed. Constructed of 1/2 inch thick thermoset polyester composite wood to match cabinet. Color: As selected by Architect from manufacturer's full line of available colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of project conditions.
- C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

3.2 INSTALLATION

- A. Assembly units and install in accordance with the approved shop drawings and the manufacturer's written installation instructions.
 1. Furnish and install all filler pieces to completely fill recesses, and to align with ends of partitions. Refer to the Drawings for the various conditions.
- B. Set storage units absolutely level and in true line, with units bolted together and to the surrounding partitions, to provide a rigid and secure installation.

3.3 ADJUSTING

- A. Adjust all hardware for smooth operation.

3.4 CLEANING

- A. After completion of the work of this Section, remove equipment, and clean all wall, partition, and floor areas free from waste from materials installed under this Section.
 - 1. Clean all surfaces of soil.
 - 2. Remove all packaging materials and construction debris.

End of Section

Section 12 35 53
LABORATORY CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies all work and materials for casework of types and sizes shown on the Drawings, as specified herein. The types of work of this section includes, but is not limited to:
1. Plastic laminate clad laboratory casework, including wall and base cabinets.
 2. Mobile teacher and student desks.
 3. Shelving systems including metal supports.
 4. Science area plumbing and gas fixtures and fittings including overflows, plugs, strainers and tailpieces that occur above the floor and required for mounting in the equipment. shall be furnished and installed under Section 22 00 00 - PLUMBING, except for pre-plumbed casework and laboratory equipment.
 5. Electrical service fixtures, including nipples, required for mounting in or on equipment shall be furnished and installed under Division 26 - ELECTRICAL.
 6. Install access panels where required for mechanical and electrical work.
 7. Casework manufacturer is responsible for all plumbing cutouts except as otherwise indicated herein.
 8. Pencil grilles.
- B. Make all cutouts within casework items to accommodate sinks, piping, conduit, and other mechanical and electrical work, from templates provided by the respective mechanical and electrical trades.
- C. Furnish and provide all materials and services as may be additional or separately described under other Sections of this Specification.
1. No attempt is made in this Section to list all elements of casework required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.
- D. Remove all debris, dirt and rubbish accumulated as a result of this installation, and leave the premises clean and ready for use. This shall include cleaning equipment interiors, exteriors, and worktops.
- E. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will

be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4*, *LEED for Building Design and Construction*, *LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking
- F. Section 06 40 00 - ARCHITECTURAL WOODWORK.
- G. Section 09 29 00 - GYPSUM BOARD. Gypsum board surfaces adjacent to wall and base cabinets and backsplashes.
- H. Section 09 65 13 - RESILIENT BASE AND ACCESSORIES. Resilient base occurring at kick toe areas of casework.
- I. Section 12 36 53 – LABORATORY COUNTERTOPS. Resin countertops installed over casework specified in this Section.
- J. Division 22 - PLUMBING. Plumbing occurring in casework.
- K. Division 26 - ELECTRICAL: Wiring, fixtures and lighting occurring in casework.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - References. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM C 209 - Test Methods for Cellulosic Fiber Insulating Board.
 - 2. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 3. ASTM D 523 - Standard Specification for Specular Gloss.
 - 4. ASTM D 1037 - Test Methods of Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
 - 5. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 6. AWI (Architectural Woodwork Institute) Architectural Woodwork Standards.
 - 7. APA Grades and Specifications.
 - 8. FSC (Forest Stewardship Council): "FSC Certification Program"

9. National Lumber Grades Authority, American Lumber Standards, and Grading Rules and Standards of the various lumber associations whose species are being used, with grade-marks for same.
10. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber; and Product Standard (PS):
 - a. PS-1 - Construction and Industrial Plywood Standard.
 - b. PS-20 - American Softwood Lumber Standard.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
 - a. Submit test data on chemical resistance of epoxy resin tops
 2. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 3. Materials schedule: A complete schedule of casework components, coordinated with the Contract Drawings.
 4. Manufacturer's instructions for resin tops: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
 5. Shop Drawings in sufficient detail to show required blocking, fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
 6. Selection samples:
 - a. Sample card indicating Manufacturer's full range of wood veneer stains, colors of laminate, edging or other surfacing material, available for selection by Architect.
 - b. Provide additional samples as requested by Architect for initial selection of colors and finishes.
 7. Verification samples:
 - a. Complete sample base cabinet unit of each type specified, 24 inches wide, with countertop and at least one door with specified hardware including lock, and one drawer with specified hardware and slide. Sample shall show full construction of all joints in casework and sample joint in worktop. Reviewed and accepted sample will be used for the purpose for establishing a quality control standard, and may not be incorporated into the work.
 - b. Sample of each type of hardware in specified finish.
 8. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required

following initial Green Building Certification Institute (GBCI) review of LEED Application.

- c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
- e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
- f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- g. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for certified wood.

1.5 QUALITY ASSURANCE

A. Certifications:

1. All wood products furnished under this Specification Section shall be “FSC Certified” according to the rules of the Forest Stewardship Council (FSC).
 - a. FSC Certification includes the following certification bodies of forests and forest products:
 - 1) SCS Global Services.
 - 2) SmartWood.
 - 3) SGS Qualifor.
 - 4) Soil Association.

B. Joinery: All joinery work performed under this Section shall be of Premium Quality Grade, as defined in the current edition, of the AWI (Architectural Woodwork Institute) Architectural Woodwork Standards.

C. Cabinet Finishes:

1. Performance Tests: Chemical spot test shall be made by applying 10 drops of each reagent to the surface at 77 degrees F. and covered with an upright wide mouth bottle, 2 oz. capacity, to retard evaporation. Spot tests of volatile solvents marked with an * shall be tested as follows: A one inch diameter ball of cotton shall be saturated with the solvent and placed on the surface to be

tested and covered with an inverted wide mouth bottle, 2 oz. capacity, to regard evaporation and keep the surface wet with solvent for duration of tests. All reagents shall remain on the surface for a period of one hour. At the end of the test, bottles are removed, excess solvents swabbed with cotton ball, and entire test surface rinsed thoroughly, dried carefully and examined. There shall be no effect other than slight discoloration, change of gloss, or temporary slight softening of the film.

a. Reagents Used:

Hydrochloric Acid, 37%	Methyl Alcohol*
Sulfuric Acid, 55%	Ethyl Alcohol*
Nitric Acid, 30%	Ethyl Acetate*
Acetic Acid, Glacial	Acetone*
Phosphoric Acid, 75%	Methyl Ethyl Ketone*
Ammonium Hydroxide, 28%	Benzene*
Sodium Hydroxide, 10%	Toluene*
Gasoline*	Chloroform*
Naptha*	Carbon Tetrachloride*

- Heat resistance: Hot water (190 degrees-205 degrees) shall be allowed to trickle onto the surface, which shall be set at an angle of 45 degrees from horizontal for a period of 5 minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water.
- Moisture resistance: A cellulose sponge (2 inches by 3 inches by 1 inch) shall be soaked with water and place on the surface of the finish for a period of 100 hours. The sponge shall be maintained in a wet condition throughout duration of tests. At the end of the test, the surface shall be dried and upon examination, shall show no blushing or whitening of the finish.
- Impact resistance: A one pound steel ball (approximately 2 inches in diameter) shall be dropped for a distance of one foot onto the finished surface of a ¼ inch thick plywood panel supported underneath by solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close examination.

1.6 FIELD MEASUREMENTS

- A. Field dimensions: The casework vendor is responsible for details and dimensions not controlled by Project conditions and shall show on his shop drawings all required field measurements beyond his control.
- The Contractor shall acknowledge the casework vendor's need for accurate field dimensions prior to custom fabrication.
 - The Contractor and the casework vendor's shall cooperate to establish and maintain these field dimensions.
 - The casework vendor shall verify confirm all dimensions at the Project site relative to casework, all, and bring any significant discrepancies to the attention of the Architect prior to casework fabrication.
 - The casework vendor shall provide all necessary closures/fillers, and extended stiles, face frames tops, sides, bottoms as required to interface with existing building's curved geometry.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.8 PRODUCT HANDLING

- A. Delivery and Storage: Deliver materials under protective cover and store within dry enclosed space.
- B. Protection: Use all means necessary to protect materials of this Section during transition, before, during, and after installation and to protect installed work and materials of all other trades.
 - 1. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes.
 - 2. Do not deliver casework to site until all concrete, masonry work is dry. Do not begin installation until veneer plaster has fully cured and is dry.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, at no change in Contract Sum.

1.9 WARRANTY

- A. Provide manufacturer's two year warranty against all defects in material or workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS/PRODUCTS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Kewaunee Scientific Corporation, Statesville, NC.
 - 2. LSI Corporation of America, Minneapolis, MN
 - 3. CIF Lab Solutions, Vaughan, Ontario, Canada.
 - 4. Case Systems, Midland, MI.

2.2 MATERIALS, GENERAL

- A. General Requirements: In general, all materials shall be the best of their respective kinds for the purpose intended and all methods used in construction shall conform to the best practices of the Scientific Laboratory Equipment Industry, including any specialized materials required.
 - 1. Sustainable Forest Certification: All wood shall be "Chain-of-Custody" certified as FSC Certified.
- B. Plastic laminate for casework:
 - 1. Chemical resistant laminate: Wilsonart International, Temple, TX, product "Chemsurf" Type 390-60 laminate or equal conforming to the following:

- a. Flame spread: 30 (ASTM E85, tested bonded to FR particle board).
 - b. Smoke Developed: 135 (ASTM E84, tested bonded to FR particle board).
 - c. Stain resistance: (Reagents 1 through 15): No effect.
 - d. Scratch resistance: 4.5 Newtons.
 - e. Chemical and Stain Resistant to acids, solvents, bases, reagents, and stains. Provide documented list, which shall include, but is not limited to:
 - 1) Nitric Acid (all concentrations)
 - 2) Glacial Acetic Acid (99% concentrated)
 - 3) Hydrochloric Acid (all concentrations)
 - 4) Phosphoric Acid (all concentrations)
 - 5) Formic Acid (all concentrations)
 - 6) Carbon Tetrachloride
 - 7) Carbon Disulfide
 - 8) Acetone
 - 9) Formaldehyde
 - 10) Methanol
 - 11) Ethyl Acetate
 - 12) Chloroform
 - 13) Phenol (all concentrations)
 - 14) EDTA
 - 15) Xylene
 - 16) Dopxame
 - 17) Sodium Hydroxide (all concentrations)
 - 18) Sodium Sulfide 15%
 - 19) Ammonium Hydroxide (all concentrations)
 - 20) Zinc Chloride (all concentrations)
 - 21) Sodium Chromate
 - 22) Iodine
 - 23) All standard scientific stains and indicators
 2. Core: Grade 1-M-2 minimum, 48 lb. density.
 3. Backing sheet: White thermofused melamine except high-pressure cabinet liner to be used to balance a plastic laminate surfaced panel.
 4. Hardboard: Wood fibers and resin binders formed under heat and pressure.
 5. Glue: Laminating; Type II water resistant; assembly; Type III water resistant.
 6. Edgebanding: Apply edgebanding with hot melt adhesive. PVC thickness for cabinet body edges to be .5 mm.
- C. Sealant, for joints between countertops and dissimilar materials: Joint Sealer Type 'SM' as specified in Section 07 92 00 - JOINT SEALANTS.

2.3 GRILLES

- A. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Metalaire, Clearwater, FL, product: "Series 2000 Linear Bar Grilles".
2. Airflex Industrial Corp, Farmingdale, NY, product: "#2004 Bar Grilles".
3. Register & Grille Mfg. Co., Inc, Brooklyn, NY, product: "#EP25SE10 Flange Grille".
4. Dayus Register & Grille, Windsor ON, Canada, product: "DABL" Bar Linear Grilles.

- B. Construction: Extruded aluminum face bars in 1/2" centers parallel to the long dimension; 0 degree deflection; 1-inch nominal frame border with countersunk face screw mounting holes; stainless steel square drive screw fasteners. Provide aligning pins to join multiple sections together for continuous appearance.

2.4 HARDWARE

- A. Provide finish hardware units as indicated, in satin finish stainless steel US32D.
- B. Hinges: Hinges shall be the five (5) knuckle institutional, offset type for all swinging doors. Hinges shall be 2-1/2 inches long, one (1) pair for doors under 4 ft. in height and 1-1/2 pair on doors over 4 ft. in height. Hinges are mounted with flathead screws, so applied to door and cabinet to withstand a weight load of 150 lbs. minimum. All hinges shall be satin finish stainless steel.
- C. Locks: Equal to National Lock "Remove-A-Core" 5-disc tumbler, heavy duty cylinder type. Exposed lock noses shall be dull nickel (satin) plated and stamped with identifying numbers. Locks shall have capacity for 225 primary key changes. Master key one level with the potential of 40 different, non-interchangeable master key groups
1. Provide three keys for each lock.
 2. Provide locks where indicated on Drawings. Coordinate keying requirements with Architect.
 3. Strike plates finish 26D.
- D. Drawer slides:
1. For extra heavy loads including file drawers: Full extension type, 200 pounds per pair minimum rated capacity, steel ball bearing rollers, drawer hold in feature.
 - a. Acceptable slides: Accuride N°. 3640A or approved equal.
 - b. Finish: clear lacquered zinc.
 2. For heavy loads: Full extension type, 150 pounds per pair minimum rated capacity (for drawers over 30 inches, provide 175 pounds rated capacity), steel ball bearing rollers, drawer hold in feature.
 - a. Acceptable slides, include the following, or approved equal:
 - 1) For drawers up to 24 inches wide:
 - a) Accuride N°. 4032.
 - b) Knape and Vogt N°. 8500.
 - c) Häfele N°. 4034.
 - 2) For drawers over 24 inches and up to 30 inches wide:
 - a) Accuride N°. 4032.
 - b) Knape and Vogt N°. 8500.

- c) Häfele N°. No equal.
 - 3) For drawers over 30 inches wide:
 - a) Accuride N°. 4437.
 - b) Knape and Vogt N°. 8520.
 - c) Häfele N°. No equal.
 - b. Finish: Clear lacquered zinc.
- 3. For desk and casework drawers: Full extension type, 100 pounds per pair minimum rated capacity, steel ball bearing rollers, lever disconnect, drawer hold in detent feature.
 - a. Acceptable slides, include the following, or approved equal:
 - 1) Accuride N°. 3832A
 - 2) Knape and Vogt N°. 8400.
 - 3) Häfele N°. 3832.
 - b. Finish: Clear lacquered zinc.
- E. Roller Catches: Roller catches shall be used on swinging doors. Catches shall have a spring loaded polyethylene roller and provided with a steel strike plate. Double doors without locks shall have catch on each door. Full height cases shall have latching devices located on the structurally fixed center shelf. Left hand door shall have a positive catch and left hand door shall have the lower type catch.
- F. Elbow Catches: Elbow catches and strike plates shall be used on left hand doors of double door cases where locks are used, and are to be steel, cadmium plated.
- G. Shelf Clips: Transparent plastic clips for plastic laminate shelves, equal to Hafele model No. 282.47.402.
- H. Support Rods, Upright Rod Assemblies and Rod Sockets: Upright rods, cross rods and ring support rods, where specified, shall be anodized Duralumin (1/2 inch or 3/4 inch dia., as required). Rod sockets shall be chrome plated brass, secured through table tops with lock nut and spring washer. Rod clamps shall be heavy duty, designed to securely hold rod assembly in any position. Use of wood rod assemblies will not be acceptable.
- I. Leg Shoes: Leg Shoes shall be provided on all table legs, unless otherwise specified, to conceal leveling device. Shoes shall be 2-1/2 inch high and a pliable, black vinyl material. Use of a leg shoe which does not conceal leveling device will not be acceptable.
- J. Casters: Lockable type.
 - 1. Capacity: Stainless steel 300 pound per caster:
 - 2. Locations: Moveable student tables.
 - 3. Construction:
 - a. Wheel housing: Stamped stainless steel bracket, stainless steel stem and stainless steel swivel with a seal and grease fitting.
 - b. Wheel treads: Black polyolefin.
 - 1) Caster wheel diameter: As selected by the Architect from manufacturer's standard sizes.

- K. Number Plates: None Required.
- L. Leveling Devices: Leveling devices shall be furnished only where shown or specifically called for, and shall be adaptable to table legs or the bottom corners of base cabinets. Device shall consist of a 1/2 inch dia. bolt threaded through a 1/2 inch tee nut which is securely screwed to bottom of leg, or to 1-5/8 inch U-shaped 12 gauge metal bracket with leveling bolts mounted at the four bottom corners of a base cabinet. Bolts shall be cadmium plated steel with a hexagonal head to provide bearing against a 12 gauge flat steel floor plate. Bolts shall be accessible for adjustment through cupboard bottoms and drawer openings when installed on base cabinets.
- M. Floor Glides: Provide for open-leg and pedestal tables, shall be a non-marring material at least 1-1/2 inch dia. to prevent indenting composition flooring and shall have at least a 5/8 inch height adjustment. Use of metal buttons will not be acceptable.
- N. Base Moldings: Provided under Section 09 65 13 - RESILIENT BASE AND ACCESSORIES.
- O. Auxillary Support Struts: Support struts shall consist of two 16 gauge channel uprights fastened top and bottom by two adjustable "U" shaped spreaders, each 1/8 by 1-1/2 inch by length required. Struts shall be furnished to support drain troughs or other abnormal loads. When specified, struts can be furnished with hangers to support mechanical service piping and drainlines.
- P. Safety screens at Mobile teacher demonstration tables.

2.5 CASEWORK FABRICATION

- A. Base units:
 - 1. Cabinet ends: 3/4 inch thick particleboard (for both exposed and concealed ends) with banding on front edges. Bore interior faces, as appropriate, for security panels, rails, and four rows of shelf support holes. Ends to be balanced panel construction.
 - 2. Backer panel: Full depth, 3/4 inch particleboard, banded front edge, and balanced surfaces, doweled to both end panels. None on sink.
 - 3. Intermediate rails: All drawer units 36 inches or wider come standard with one intermediate front rail to act as a spacer between end panels.
 - 4. Toe base: Veneer core plywood in 8 foot lengths. Construct on job-site separate from base unit.
 - 5. Bottoms: 3/4 inch thick particleboard, set flush and joined to cabinet end panels with glued 8mm dowels and metal fasteners. Front edge to be banded. Suspended unit bottoms to be 1 inch thick. Balanced surfaces.
 - a. Removable bottoms are not acceptable.
 - 6. Backs: 3/16 inch thick fused melamine hardboard; suspended units have 3/4 inch thick melamine particleboard panel, doweled into ends, balanced surfaces:
 - a. Cupboard units: One-piece, captured at subtop and bottom.
 - b. Drawer units:

- 1) One piece or two-piece behind drawers on units.
 - c. Sink units: Half-height, one-piece hardboard, rabbeted into rear rail for easy removal from inside of cabinet.
 7. Vertical dividers in combination cabinets: 1-1/2 inch thick particle board panel (frames not permitted) glued and screwed in place, top and bottom with edgebanding on front edge.
 8. Shelves: 3/4 inch thermofused melamine clad particleboard to match interior, PVC banded front edge to match interior color, adjustable on 32mm centers
 9. Drawers:
 - a. Drawer sides and backs: Dovetail construction, 1/2 inch thick solid hardwood of specified species.
 - b. Laminated drawer fronts: High density laminate over 3/4 inch specified core material. Drawer fronts shall be applied to separate drawer body component sub-front.
 - c. Drawer bottoms (plastic laminated millwork): 1/4 inch thick plywood panel with plastic laminate, housed and glued into front, sides and back.
 - d. Underside of drawer to receive continuous hot melt glue at joint between bottom and back/sides/front for sealing and rigidity.
 - e. Reinforce drawer bottoms as required with intermediate spreaders.
 - f. Drawer box shall be the maximum height that allows for proper operation of drawer and hardware
 10. Bottom: Nominal 1/2 inch with stiffeners, (1) at 24 inches, (2) at 36 inches and (3) at 48 inches white coated MDF board, inset into all four sides of drawer box and sealed with hot melt glue process around entire drawer bottom perimeter.
 11. Door and removable drawer front: 3/4 inch particleboard core with GP28 vertical surface grade high-pressure laminate, 3mm PVC banding.
 12. Fillers, kneespace panels, scribes, etc.: Shall be of the same material and finish as adjacent exposed surfaces, 3/4 inch thick particleboard.
 13. Pullboards: 1 inch thick particleboard with balanced laminated faces. Writing surface color to be Antique White. Front to be constructed the same as a drawer front as specified for cabinet face exterior.
 14. Suspension to be 3/4 extension, open roller, 75 lb. dynamic load, with hold open feature and epoxy coated.
 15. Knee space table frame: 3/4 inch particleboard; 3/4 inch hardwood if drawer cutouts are included.
 16. At standalone sandwich end panels, provide full width pvc edge banding.
- B. Wall, upper and tall cases:
1. Shall be manufactured with appropriate materials and joinery methods as specified for base units except as noted below.
 2. Tops: 3/4 inch thick, particleboard with banding on front edge.
 3. Bottoms:
 - a. Wall and upper case: 3/4 inch thick, particleboard with banding on front edge.

- b. Tall case: 3/4 inch thick, 7-ply veneer core plywood with banding on front edge. Bottom plywood kick rail 3-3/4 inch high joined to cabinet sides.
4. Backs: 1/4 inch hardboard, thermofused melamine interior, captured in top, bottom and side panels; mounting cleat at top.
5. Shelves: (Fixed shelves are 3/4 inch thick particleboard): 3/4 inch thick, thermofused melamine clad particleboard to match interior, PVC banded on front edge to match interior color, adjustable on 32mm centers.
6. Solid door construction: 3/4 inch thick particleboard core with 3mm PVC banding on all four edges, balanced construction. For sliding doors, nylon roller suspension riding in overhead steel track with bottom retainer strip.
7. Framed glass doors: 3/4 inch particleboard routed to accept extruded vinyl glass retainer; laminate clad and edgebanded with 3mm PVC; capture 7/32 inch tempered glass both sides in extruded vinyl molding. For sliding doors, nylon roller suspension riding in overhead steel track with bottom retainer strip.
8. Unframed sliding glass doors: 7/32 inch tempered glass with edges ground, set in extruded aluminum shoe with integral pulls, nylon wheel assemblies and top and bottom extruded aluminum track. Provide rubber bumpers at fully opened and closed door position

PART 3 - EXECUTION

3.1 INSTALLATION - CABINETS

- A. Install all casework plumb, level, true and straight with no distortions. Cabinets at right angles to each other shall be erected at 90 degrees to each other unless otherwise indicated. Shim as required, using concealed shims. Where cabinets abut other finished work, scribe and apply filler strips, filler panels and fascias for accurate fit with fasteners concealed where practical and flush with cabinets alongside.
- B. Base Cabinets: Set cabinets straight, plumb and level. Adjust sub-tops within 1/16 inch of a single plane. Fasten each individual cabinet to wall, with stainless steel or chrome finished oval head screws with grommets spaced 24 inches o.c. Bolt continuous cabinets together. Secure individual cabinets with not less than two fasteners into floor, where they do not adjoin other cabinets.
 1. Where required, assemble units into one integral unit with joints flush, tight, and uniform.. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
- C. Wall Cabinets: Securely fasten to solid supporting material, not plaster, lath, or wall board. Anchor, adjust, and align wall cabinets as specified for base cabinets.
 1. Reinforcement of stud walls to support wall-mounted cabinets will be done during wall erection by trade involved, but responsibility for accurate location and sizing of reinforcement is part of this work.
- D. Adjust casework and hardware so that doors and drawers operate smoothly without wrap or bind. Lubricate operating hardware as recommended by manufacturer.

3.2 TOLERANCES

- A. Maximum variation from true position 1/16 inch with a maximum of 1/32 inch offset from true alignment with adjoining surfaces intended to be flush.

3.3 ADJUSTING

- A. To whatever extent work was not completed at shop or prior to installation of casework, perform and complete the specified finishing of casework.
- B. Repair damaged and defective casework where possible eliminating defects functionally and visually.
 - 1. Where not possible to repair damaged or defective work, replace with matching new work.
 - 2. Adjust joinery for uniform appearance.
- C. Adjust doors and drawers for smooth and balanced movement, lubricate hardware for use.

3.4 CLEANING

- A. Clean Up: Remove all cartons, debris, sawdust, scraps, etc., and leave spaces clean and all casework ready for Owner's use. Vacuum inside of all cabinets, drawers and shelves.

3.5 PROTECTION

- A. Protect all casework with heavy cardboard or similar material until direct by Construction Manager to remove the same.

End of Section

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Section 12 36 53
LABORATORY COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install epoxy resin laboratory countertops and integral sinks.
 - 1. Provide ADA compliant and standard drop-in sinks where indicated.
 - 2. Provide 4 inch high backsplash at walls behind all sinks unless otherwise indicated on the Drawings.
 - 3. Provide epoxy countertops and backsplashes at Science Rooms and Art Rooms including mobile student and teacher desks.
 - 4. Provide epoxy countertops at Robotics A309 mobile student desks.

1.2 RELATED REQUIREMENTS

- A. Section 11 53 00 – LABORATORY EQUIPMENT.
- B. Section 11 53 13 – LABORATORY FUME HOODS.
- C. Section 12 35 53 – LABORATORY CASEWORK.
- D. Division 22 – PLUMBING: All plumbing piping and connections.
- E. Division 23 – HEATING, VENTILATING AND AIR CONDITIONING.
- F. Division 26 – ELECTRICAL.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. ASTM D570 –Water Absorption of Plastics.
 - 2. ASTM D635 –Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.1
 - 3. ASTM D638 – Tensile Properties of Plastics.
 - 4. ASTM D648 – Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
 - 5. ASTM D651 – Glass-Bonded Mica Used as Electrical Insulation.
 - 6. ASTM D695 – Compressive Properties of Rigid Plastics.
 - 7. ASTM D785 – Rockwell Hardness of Plastics and Electrical Insulating Materials.
 - 8. ASTM D790-Fluctural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials.

9. ASTM E84-Surface Burning Characteristics of Building Materials.
10. ASTM G22-76(1996) – Determining Resistance of Plastics to Bacteria (a withdrawn standard).
11. National Sanitation Foundation (NSF/ANSI): Standard 51 – Food Equipment Materials.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications, performance data and physical properties.
 - a. Submit test data on chemical resistance of epoxy resin tops
 2. Manufacturer's instructions: Manufacturer's installation instructions indicating special procedures, and perimeter conditions requiring special attention.
 3. Certifications: Submit test data on chemical resistance of epoxy resin.
 4. Shop Drawings: Detailed shop drawings with field dimensions verified. Provide sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
 - a. Indicate location of seams in plastic laminate counter tops and in epoxy resin tops longer than 10 feet.
 5. Samples: Submit samples as requested by Architect including the following:
 - a. 6 by 6 inch samples of specified finishes including epoxy resin top materials.
 6. Fabrication Samples: Prior to start of work, fabricate a complete 24 inch wide base section with 1 drawer and 1 door, and epoxy work top. Sample shall show full construction of all joints in casework and sample joint in work top. Sample shall contain: door with specified hardware, drawer with slide and specified hardware, back and side panels. Samples not fully conforming to this specification shall be rejected by the Architect.
 - a. Deliver sample to Job site. Sample will be used for the purposes of establishing a quality control standard, which can be compared to the remaining Work.
 - b. Reviewed and accepted sample may be incorporated into the work.
 7. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

- d. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials, On-Site Wet-Applied Products (paints, coatings, sealants and adhesives), to provide both CDPH Standard Method v1.1 – 2010 emissions compliance and VOC compliance in accordance with SCAQMD Rule 1113 – June 3, 2011 (paints and coatings), and/or SCQMD Rule 1168 – July 1, 2005 (adhesives and sealants). Products tested/certified under the following programs will meet the emissions requirement: FloorScore; SCS Indoor Advantage Gold; UL Greenguard Gold.
 - e. Include submittal documentation requirements for IEQ Credit 2 Low Emitting Materials; Composite Wood and Batt Insulation Products to demonstrate compliance with California Air Resources Board (CARB) ATCM for ultra-low emitting formaldehyde (ULEF) resins or no-added formaldehyde (NAF) resins.
 - f. Include submittal documentation requirements for MR Credit 3 Building Product Disclosure and Optimization – Sourcing of Raw Materials for recycled content.
- B. Submit manufacturer's warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1.5 FIELD MEASUREMENTS

- A. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - 1. Verify field measurements and that laboratory countertops will fit through entryways, corridors and door openings.
 - 2. Wall-to-wall counter tops are to be installed with a maximum 1/4" gap total (1/8 inch on either end).
- B. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1.7 PRODUCT HANDLING

- A. Delivery and Storage: Deliver materials under protective cover and store within dry enclosed space.
- B. Protection: Use all means necessary to protect materials of this Section during transition, before, during, and after installation and to protect installed work and materials of all other trades.
 - 1. Store under cover in a ventilated building not exposed to extreme temperature and humidity changes.
 - 2. Do not deliver casework to site until all concrete and masonry work is dry. Do not begin installation until veneer plaster has fully cured and is dry.

- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, at no change in Contract Sum.

1.8 WARRANTY

- A. Provide manufacturer's two year warranty against all defects in material or workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on New England Laboratory, Woburn MA, representing: The Durcon Company, Inc., Plymouth MI.
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. The Durcon Company, Inc., Plymouth MI.
 - 2. Epoxyn Products, Mountain Home, AR.
 - 3. Kewaunee Scientific Equipment Corporation, Statesville NC.
 - 4. Laboratory Tops, Inc., Taylor TX.

2.2 PERFORMANCE CRITERIA

- A. Minimum tested performance criteria:
 - 1. Flexural Strength (tested per ASTM D790): 14,500 To 14,900 PSI.
 - 2. Modulus of Elasticity (tested per ASTM D790): 2,000,000 PSI.
 - 3. Compressive Strength (tested per ASTM D695): 33,500 To 38,100 PSI
 - 4. Tensile Strength (tested per ASTM D638/D651): 6,400+ PSI.
 - 5. Hardness, Rockwell "M" Scale (tested per ASTM D785): Values Of 105 To 113
Over 5 Samples - Average 109.
 - 6. Water Absorption (tested per ASTM D570): 0.008 To 0.02% After 24 Hours.
 - 7. Heat Distortion (tested per ASTM D648): 380 F (193 C).
 - 8. Flammability or Fire Resistance (tested per ASTM D635) did not ignite or self-extinguishing.
 - 9. Temperature Use Limit: 331 degrees F. (166 degrees C.).
 - 10. Fungai and Bacterial Growth Resistance (tested per ASTM G22): Approved.
 - 11. Food and Splash Zone (tested per NSF/ANSI Standard 51): Approved.
 - 12. Fire Resistance - Smoke Developed Index (tested per ASTM E84): 8.71 (In) / 221.2 (Mm).

2.3 COUNTERTOPS

- A. Countertops: 1 inch thick (typical) and $\frac{3}{4}$ inch thick (at mobile tables) molded black color modified epoxy resin that has been especially compounded, oven cured and possess high resistance to mechanical and thermal shock.
 - 1. Tops shall be a uniform mixture throughout their full thickness and not depend upon a surface coating for chemical or stain resistance.
 - 2. Integrally molded curbs: 4 inches high and 1 inch thick, and the junction between top and curb to be covered to a $\frac{5}{8}$ inch radius. End curbs shall be provided at end of runs to maintain continuity of the integral curb.
 - 3. Countertops 10 feet or less in length shall be seamless. When length of top exceeds 10 feet, seams may be provided parallel to the short dimension (Locate as shown on reviewed and accepted shop drawings). Limit seams to absolute minimum number.
 - 4. Color: As selected by Architect from manufacturer's full range of available colors

2.4 SINKS

- A. Sinks, General: Molded of same material as countertops with all inside corners coved and bottom pitched to drain outlet.
 - 1. Construction: Drop-in type sink with tapered side of sink and inside corners radiused. Pitch bottom of sink to drain. Provide undermount for sinks that exceed constraints for drop-in sinks and as otherwise indicated on Drawings.
 - 2. Provide modified epoxy resin outlets. Seal around drain with epoxy sealant as recommended by the sink manufacturer.
 - 3. Apply sink basins to countertops and ship as integral one piece unit.
 - 4. Provide sink supports as required for specified sinks.
 - 5. Provide one overflow for each sink.
 - 6. Laboratory sinks: 12 inch by 8 inch by 6 inch deep equal to Durcon Incorporated, product "Model D03C".
 - 7. Accessible laboratory sinks: 14 inch by 10 inch by 5 inch deep equal to Durcon Incorporated, product "Model A05".
 - 8. Accessible handwashing sink sinks: 18 inch by 15 inch by 15 inch deep equal to Durcon Incorporated, product "Model A25".
 - 9. Teaching station sinks: 18 inch by 15 inch by nominal 8 inch deep equal to Durcon Incorporated, product "Model D25".

2.5 ACCESSORIES

- A. Sink covers: $\frac{1}{4}$ inch thick epoxy cover for all sinks matching countertop color with fingerhole in cover center for removal.
- B. Sealant, for joints between countertops and dissimilar materials: Joint Sealer Type 'SM' as specified in Section 07 92 00 - JOINT SEALANTS.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
 - 1. Carefully examine the installed work of others and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify adequacy of backing and support framing: Coordinate with the General Contractor/Construction Manager to verify that required backing and reinforcements are in place, secure, and accurately located and that project is ready for the installation of the laboratory countertops.
- B. Proceed with work when conditions permit Work to be installed in complete accordance with the original design, accepted submittals, and the manufacturer's written instructions.
- C. In the event of discrepancy, immediately notify the Architect in writing. Do not proceed with the installation in areas of discrepancy until issues have been resolved
- D. Beginning of installation means acceptance of project conditions.

3.2 INSTALLATION

- A. Counter top lengths shall be fabricated as specified and indicated on the drawings with ends abutting tightly in a hairline joints, single true plane, smooth and level with no raised edges at the joints with supports place to prevent deflection. All joints are to be sealed with corrosion resistant sealants.
- B. Make field jointing in same manner as factory jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted submittal drawings. Joints shall be factory prepared requiring no job site processing of top and edge surfaces.
- C. Tops shall be anchored to base cabinets. Secure tops to cabinets/supports with concealed "Z" type angles or equal fastening devices spaced no more that 24 inches on center, with one located within 6 inches of front and back edge. Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints. Countersink exposed heads approximately 1/8 inch and plug flush with material equal in chemical resistant, color, harshness and texture to adjoining surface. Where work surface in intended to be moveable use a clamping device that is removable. Counter tops to be installed with a maximum 1/8" gap. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches on center.
- D. Provide holes and cutouts as required for equipment and service fittings and fixtures. Verify size of opening with actual size of item to be used, prior to making openings. Form inside corners to a radius of not less than 1/8". After cutting, rout and file cutouts to ensure smooth, crack-free edges. Seal exposed edges after cutting with a chemical resistant sealer recommended by the manufacturer.

- E. Provide scribe moldings for closures at junctures of countertop, curb and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
- F. Carefully dress joints smooth, remove surface scratches and clean entire surface.

3.3 CLEANING

- A. Repair or remove and replace defective, damaged or soiled work to match original factory finish.
- B. Clean finished surfaces, including wiping of drawers and cabinet shelves, touch up as required.
- C. Clean counter tops leaving tops free of grease and streaks. Use no wax or oils.

3.4 PROTECTION

- A. Protect against soiling and deterioration during remainder of construction period.
- B. Protect counter tops and ledges for the remainder of the construction period with 1/4" corrugated cardboard or equal completely covering the top and securely taped to edges. Mark cardboard in large lettering "No Standing".

End of Section

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Section 12 61 00
FIXED AUDIENCE SEATING

PART 1 GENERAL

1.1 SUMMARY

- A. The work of this Section consists of furnishing and install seating where shown on the Drawings, as specified herein, and as required for a complete and proper installation.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 03 30 00 - CAST-IN-PLACE CONCRETE.
- E. Division 26 - ELECTRICAL: Electrical work related to items in this Section.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. Comply with all applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
2. Certification: Manufacturer's written certification stating that seating to be furnished hereunder, meet or exceed the requirements specified under this Section and the fire resistive requirements of California Technical Bulletin No. 133 for the indicated requirements have been met.
3. Shop drawings:
 - a. Large scale plans, completely-dimensioned showing seating layout. Vary lateral sizes of chair backs, with standards in each row spaced laterally so that the end standards shall be in alignment from first to last row whether aisles are of constant or converging width. Spacing from chairs to walls shall be nominally 1-1/2 inches, and in no circumstances exceed 4 inches. Back to back spacing of chairs shall be not less than 33 inches. Subcontractor assumes complete responsibility for accuracy of layout, and coordination with other trades. As a minimum, indicate the following:
 - 1) All chair sizes, chair pedestals and aisle widths. Not more than 15 percent of chairs may be 19 inch width.
 - 2) Wheelchair locations and handicap seating locations
 - 3) Aisle lighting locations.
 - 4) Aisle and seat numbering scheme.
 - b. Large scale details of chair construction, bases, pedestals, and all other components of the seats.
 - 1) Indicate all materials, sizes, gauges, thickness, and weights.
 - 2) Provide complete setting diagrams including anchorage details.
 - 3) Indicate relationship to electrical stub-outs for aisle lighting.
4. Verification samples:
 - a. 36 x 36 inch (1 square yard) samples of upholstery for each color selected by Architect.
 - b. One complete chair demonstrating all selected finishes and specified components. Approved sample will be returned to Contractor and may be installed in project.
5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.5 REGULATORY REQUIREMENTS

- A. Chairs shall have been tested in accordance with California Technical Bulletin No. 133 and certified as passing such tests. Every chair shall be labeled with certification label.
- B. Send copy of certificate of compliance to municipal authority having jurisdiction.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Do not deliver seating units materials to the project until finish work has been completed and dry, including finish woodwork, ceiling materials, wall finishes and painting.
- C. Protect seats from damage due to moisture, direct sunlight, excessive temperatures, surface contamination and damage from construction operations and other causes.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature above 55 degrees Fahrenheit for 5 calendar days before and during installation of chairs; maintain same temperature until Owner's Final Acceptance.
- B. Maintain a relative humidity between 25 and 55 percent for a minimum period of 5 calendar days before and during installation of chairs: maintain same relative humidity until Owner's Final Acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURER AND MODEL

- A. Specified manufacturer: To establish a level of quality and visual characteristics desired, Drawings and Specifications are based on Hussey Products Company, North Berwick ME, model "Quattro" with 33 and 36 inch "Soft Square Backs".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Hussey Products Company, North Berwick ME.
 - 2. Irwin Seating Company, Grand Rapids, Michigan.
 - 3. KI Furniture and Seating, Green Bay WI.

2.2 MATERIALS - GENERAL

- A. Steel: All steel shall have smooth surfaces and be of sufficient gauge thickness and designed to withstand strains of normal use and abuse.
- B. Padding material: Seat and back padding material shall be of new (prime manufacture) polyurethane foam. Padding material shall comply with the flammability requirements outlined in California Technical Information Bulletin

#117, Resilient Cellular materials, Section A & D, dated February 1975, when tested in accordance with Federal Test Method Standard 191, Method 5903.2.

1. Padding shall be securely adhered to plywood inner shell.
- C. Wood: Plywood, exposed or concealed, hard wood, hot press laminated using high frequency process. Interior plys shall be Class 3 or better. Exposed exterior plys shall be Class Particle core shall be 55 pound density.
- D. Glue: All plywood shall be joined using urea resin adhesive or equal complying with ASTM D805 tests with the following results:
1. 20 dry sear test pulls, no less than 300 pounds per square inch.
 2. 10 wet shear test pulls after 48 hours immersion, not less than 200 pounds per square inch.
- E. Upholstery Fabric: 100 percent Marquesa Lana continuous filament Olefin yarn. "Sherpa" or "Shire" patterns by West Point Pepperell, minimum weight at least 14.4 ounces per lineal yard (exclusive of backing), minimum of 13 ends and 13 pickes per inch., Fabric shall meet class 1 flammability requirements of US Department of Commerce Commercial Standard 191 per California technical Bulletin No. 117.
1. Treat fabric for fire retardance to comply with Massachusetts Fire Code Regulation FPR 20 and California Technical Fire Safety Bulletin 117 Section E, NFPA 701 and as additionally required by City of Worcester Fire Marshall.
 2. Fabric color and pattern shall be as selected by Architect from manufacturer's full available line.
- F. Injection molded plastic: one-piece high-impact, linear polyethylene with built-in ultraviolet light inhibitors to retard fading. Plastic shall have a burn rate of 1 inch per minute when tested in accordance with ASTM D635 or the Department of Transportation Motor Vehicle Safety Standard No. 302. Color shall be selected from manufacturer's standard color range.

2.3 SEATING

- A. Chairs, General: Floor attached type, 19, 20, 21 and 22 inch widths, consisting of an attached inner upholstered back and hinged fully upholstered seat which automatically returns to an upright three-quarter fold position.
1. Not more than 15 percent of all seating may be 19 inches.
 2. Provide armless seats in compliance with accessibility requirements, where indicated on the Drawings.
 3. Provide transfer seats in compliance with accessibility requirements.
 4. Provide accessible locations as indicated.
 5. Provide portable stacking chairs with finish matching fixed seating and dollies (one per four chairs)
- B. Standards:
1. Standards: Pedestal design, 1 by 3 inch [25 mm by 76 mm] solid cast material. A reinforced 1/4" bracket for seat pan attachment shall be integrated into the standard which has an inlay at mid-point for resistance upon force. The seat pan shall be anchored to the standard by use of a hexagon 5/16" fusion nut and a hexagon bolt of 5/16" x 3/4". A lug support for attachment of

- the back shall be made of 14 gauge sheet metal. Welded to the top of the column shall be a 14 gauge dove tail for attachment.
2. Aisle Standards-Rectangular-3/4 size design: The aisle standards shall be fabricated in the same manner as the center standards:
 3. Floor mounting: Solid cast foot. The formed foot shall be forged to the upright tubular member. The floor mount standards shall be manufactured to match floor inclines in order to maintain proper seat height and angle.
- C. Chair backs: Padded and upholstered with one-piece injection molded outer panel and hardwood inner upholstery panel.
1. Style: Equal to Hussey Quattro "Soft Square Backs", typically 33 inch back height (measured from floor).
 2. Outer back panel: Injection molded polypropylene plastic. The panel shall be no less than 27" in length and conceal the rear and sides of the upholstered inner panel.
 - a. Plastic color shall be chosen from manufacturer's standard colors.
 3. Inner upholstered panel: nominal 5/8 inch (15mm) thick, multi-ply thick-formed hardwood (not less than 5 ply) with an ergonomically engineered contour. The wings for attachment of chair back to standard shall be not less than 14 gage (1.9mm), attached with concealed fasteners.
 - a. Wings shall position the chair back at one of three manufacturer's set positions which range from not less than 15 degrees to a maximum of 24 degree pitch.
 4. Padding: 2 inch thickness, contoured foam.
- D. Seat assembly: Self-lifting seat, padded and upholstered with one-piece injection molded outer panel and hardwood inner upholstery panel.
1. Counter Balance: The seat pan shall rotate on two solid steel rods with lifetime lubricated nylon shoulder bushings. The rear area of the pan shall be weighted to create a counterbalance that allows the seat to return to 90 degree vertical position by means of gravity.
 2. Provide seat numbers and locate them on the front edge of the seat pan.
- E. Armrests: Polymer 2-1/4 inches wide and 12 inches long.
1. Finish:
 - a. Color: Manufacturer's standard color as selected by Architect from full range of available colors.
 2. ADA swing-up armrests to hinge with cantilevered end standards to allow equal access for disabled patrons. Accessible chairs shall include the universal handicapped symbol on the cantilevered end aisle standard for clear identification.
 - a. Provide not less than four seats with ADA transfer armrests.
 - b. Provide at each ADA companion seat.
 3. Provide manufacturer's standard low-mount lighting under armrests where indicated.
 4. Provide extra armrests equal to 2 percent of total number of seats installed

- F. Aisle Lights: UL listed, prewired and finished complete with utility box, light socket, LED lighting and detachable lens plate, located under arms.
 - 1. Provide 1 light per riser/step to be on side of seating areas.
- G. Number and letter plates: 5/8 by 1-5/8 inch aluminum finished plates with Helvetica Medium letter and numerals.
 - 1. Attach plates with escutcheon pins with matching finish.
- H. Accessories: Dolly for transportation of removeable chairs, four (4) seat capacity minimum.

2.4 FINISHES

- A. Finish for Cast Metal Components: Material shall be pre-treated in an iron phosphate wash system prior to finish application. Finish shall be a specially blended polyester T.G.I.C./Epoxy powder coating with a minimum dry film thickness of 1.5 mils.
- B. Injection molded polypropylene or nylon: Textured surface, through-color pigmented, in color selected by Architect from manufacturers full range of standard colors.
- C. Fabric: Upholstery material shall be 100% Marquesa Lana continuous filament Olefin yarn with one of manufacturer's standard fabric offerings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

- A. Install chairs in locations indicted on reviewed and accepted shop drawings in accordance with manufacturers written instructions.

3.3 TOLERANCES

- A. Maximum variation from plumb or level: 1/8 inch.

3.4 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- B. Clean work under provisions of Section 01 77 00 - CLOSEOUT PROCEDURES.

3.5 PROTECTION

- A. Protect chairs with plastic covers under provisions of Section 01 50 00 -
TEMPORARY FACILITIES AND CONTROLS.

End of Section

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Section 12 66 13
TELESCOPING BLEACHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnishing and install telescoping, motorized, gymnasium bleacher seating, removeable scorer's table.
- B. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.2 RELATED SECTIONS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 09 64 66 - WOOD ATHLETIC FLOORING.
- F. Division 26 – ELECTRICAL: Power supply and coordination of electrical outlets and devices at front skirt of bleachers.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. Comply with all applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
1. Literature: Manufacturer's product data sheets, specifications and installation instructions.
 2. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 3. Shop drawings: Large scale plans showing bleacher layout. Include painted on graphics.
 4. Samples: Minimum 2 square foot sample of painted graphics.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.

1.5 QUALITY ASSURANCE

- A. Seating Layout: Comply with ICCA 300 -2012 Standard for Bleachers, Folding Telescopic Seating and Grandstands, except where additional requirements are indicated or imposed by authorities having jurisdiction.
- B. Welding Standards & Qualification: Comply with AWS D1.1 Structural Welding Code - Steel and AWS D1.3 Structural Welding Code - Sheet Steel.
- C. Manufacturer Qualifications: Manufacturer who has a minimum of 40 years of experience manufacturing telescoping gym seats and can demonstrate continual design enhancement and 25-year minimum product life-cycle support of telescopic seating.
- D. Installer Qualifications: Engage experienced Installer who has specialized in installation of telescoping gym seat types similar to types required for this project and who carries an official Certification Card issued by telescoping gym seat manufacturer.
- E. Engineer Qualifications: Engage licensed professional engineer experienced in providing engineering services of the kind indicated that have resulted in the successful installation of telescoping bleachers similar in material, design, fabrication, and extent to those types indicated for this project.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
- B. Do not deliver seating units materials to the project until finish work has been completed and dry, including finish woodwork, ceiling materials, wall finishes and painting. Coordinate installation of bleachers with Section 09 64 66 - WOOD ATHLETIC FLOORING. Take all precautions necessary to protect flooring.
- C. Protect bleacher components from damage due to moisture, excessive temperatures and damage from construction operations and other causes.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature above 55 degrees Fahrenheit for 5 calendar days before and during installation of bleachers; maintain same temperature until Owner's Final Acceptance.
- B. Maintain a relative humidity between 25 and 55 percent for a minimum period of 5 calendar days before and during installation of bleachers: maintain same relative humidity until Owner's Final Acceptance.

1.8 WARRANTIES

- A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Hussey Seating Company, Product: "Maxam26 with Courtside Collection Seating XCS12", (12 inch width).
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Hussey Seating Company, North Berwick, ME.
 - 2. Folding Bleachers Company, Effingham, IL
 - 3. Interkal Inc., Kalamazoo, MI.

2.2 SYSTEM DESIGN CRITERIA

- A. Gymnasium seat assembly, shall be designed to support and resist, in addition to it's own weight, the following forces:
 - 1. Live load of 120 lbs per linear foot [162.69 N/m] on seats and decking.
 - 2. Uniformly distributed live load of not less than 100 lbs per sq. ft. [135.58N/m] of gross horizontal projection.

3. Parallel sway load of 24 lbs. [32.53 N/m] per linear foot of row combined with (2) above.
 4. Perpendicular sway load of 10 lbs. [13.56 N - m] per linear foot of row combined with (2.) above.
- B. Hand Railings, Posts and Supports, shall be engineered to withstand the following forces applied separately:
1. Concentrated load of 200 lbs. [90.72 kg] applied at any point and in any direction.
 2. Uniform load of 50 lbs. per foot [.344 N/mm²] applied in any direction.
- C. Guard Railings, Post and Supports, (Shall be engineered to withstand the following forces applied separately:
1. Concentrated load of 200 lbs. [90.72 kg] applied at any point and in any direction along top rail.
 2. Uniform load of 50 lbs. per foot [.344 N/mm²] applied horizontally at top rail and a simultaneous uniform load of 100 lbs. per foot [.689 N/mm²] applied vertically downward.
- D. Member Sizes and Connections: Design criteria (current edition) of the following shall be The basis for calculation of member sizes and connections:
1. AISC: Manual of Steel Construction.
 2. AISI: Specification for Design of Cold Formed Steel Structural Members.
 3. AA: Specification for Aluminum Structures.
 4. NFOPA: National Design Guide For Wood Construction.

2.3 MATERIALS

- A. Lumber: ANSI/Voluntary Product 20, B & B southern pine.
- B. Plywood: ANSI/Voluntary Product PS1, APA A-C exterior grade.
- C. Structural steel shapes, plates and bars: ASTM A 36.
- D. Uncoated steel strip (non-structural components):
- E. ASTM A569, commercial quality, hot-rolled strip.
- F. Uncoated steel strip (structural components): ASTM A570 Grade 33, 40, 45, or 50, Structural Quality, Hot-Rolled Strip.
- G. Uncoated Steel Strip (Structural Components): ASTM A607 Grade 45 or 50, high-strength, low alloy, hot-rolled strip.
- H. Galvanized steel strip: ASTM A653 Grade 40, zinc coated by the hot-dip process, structural quality.
- I. Structural tubing: ASTM A500 Grade B, cold-formed.

- J. Polyethylene Plastic: ASTM D 1248, Type III, Class B; molded, color-pigmented, textured, impact-resistant, structural formulation; in color as selected by Architect from manufacturer's standard colors, unless otherwise indicated.
- K. Fasteners: Vibration-proof, of size and material standard with manufacturer.

2.4 BLEACHERS

- A. General: Wall attached bleachers with continuous rows, and railings at each end. Units with 24 inch row spacing seat spacing as indicated on the Drawings, with aisles spaced as indicated on Drawings. Seat rows shall have a rise not less than 9-1/2 inches and not more than 10-1/2 inches.
 - 1. Net capacity: Single bank, 12 rows, for total of 688 persons (typical for two sides of Gymnasium, refer to Drawings).
 - 2. Partial opening limit restraints: Provide 8 per side minimum with captive interlock and adjustable row stops.
- B. Understructure fabrication:
 - 1. Frame System:
 - a. Wheels: Not less than 5 inches [127] diameter by 1-1/4 inches [32] with non-marring soft rubber face with molded-in sintered iron oil-impregnated bushings to fit 3/8 inch [10] diameter axles secured with E-type snap rings.
 - b. Lower Track: Continuous positive interglide system using an integral, continuous, anti-drift feature and through-bolted guide at front. Manual sections shall contain a low profile lock equal to Hussey Posi-Lock LX to lock each row in open position and allow unlocking automatically. Provide adjustable stops to allow field adjustment of row spacings.'
 - c. Slant Columns: High tensile steel, tubular shape.
 - d. Sway Bracing: High tensile steel members through-bolted to columns.
 - e. Deck Stabilizer: High tensile steel member through-bolted to nose and riser at three locations per section. Interlocks with adjacent stabilizer on upper tier using low-friction nylon roller incorporates multiple stops to allow field adjustment of row spacings.
 - f. Deck Support: Captures front and rear edge of decking at rear edge of nose beam and lower edge of riser beam for entire length of section.
 - 2. Deck System:
 - a. Section Lengths: Each bank shall contain sections not to exceed 25'-6" in length with a minimum of two supporting frames per row, each section.
 - b. Nose beam and rear riser beam: Nose beam shall be continuously roll-formed closed tubular shape of ASTM A653 grade 40, Riser beam shall be continuously roll-formed of ASTM A653 grade 40. Nose and Riser beam shall be designed with no steel edges exposed to spectator after product assembly.
 - c. Attachment: Through-Bolted fore/aft to deck stabilizers, and frame cantilevers.
 - d. Decking: 5/8 inch [16], AC grade clear-top-coated tongue and groove Southern Yellow Pine of interior type with exterior glue, 5-ply, all plies

- with plugged crossbands, produced in accordance with National Bureau of Standards PS-1-97. Plywood shall be cut and installed with top, center and bottom ply grain-oriented from front of deck to rear of deck (nose beam to riser beam). Adjacent pieces shall be locked together with tongue and groove joint from front to rear of deck. Longest unsupported span: 21-1/2 inches [546].
- e. Deck end overhang: Not to exceed frame support by more than 5'-7" [1702].
3. Seating Fabrication: Equal to Hussey Plastic Seat System –Courtside Collection - XCS12 Comfort Profile (12 inch):
- a. Contoured Seat Modules: 18 inches [457] long assembled, gas assisted injection-molded, high density, 100 percent recyclable HDPE (high density polyethylene) modules in monochromatic colors, dual textured scuff resistant wide seat surface with 1/2 inch [13] minimum interlock on seat and face. Unit shall be structurally tested to 600 lbs. occupant load.
 - 1)
 - 2) Individual ergonomically contoured seat module with compound contoured seats with fore/aft and horizontally contoured curves provide a “scalloped” surface area with forward edge “waterfall” for enhanced spectator comfort and minimization of sensitive pressure point area regardless of leg positioning.
 - 3) Seat height ranges from deck to top of seat range from 16-1/8 inches [410] to 18-1/8 inches [460]
 - 4) Provide minimum 21-1/8 inch [537] clear foot space area.
 - 5) Integrally molded end caps at aisle end locations.
 - 6) Integrally molded recess pockets to accept seat number and row letters.
 - 7) Integrally molded rear closure panel at back of seat to allow for “continuous clean sweep” of debris at deck level and minimized visibility of structural ribbing.
 - 8) Seat Attachment: Each seat module shall be securely anchored by a 12 gage steel clamp bracket that provides steel-to-steel, through bolted attachment to the front nose beam of the bleacher.

2.5 MOTORIZED SEATING

- A. Integral Power: Furnish and install an integral automatic electro-mechanical propulsion system, to open and close telescopic seating. System shall be Underwriters Laboratories, Inc. (UL) approved and listed.
 - 1. Operation shall be with wireless remote controls (provide three [3]) equal to Hussey with receiver and all associated components.
 - 2. Each unit shall consist of output shaft gear reducer with 6 inch diameter by 4 inch shall be fitted with induction motors, which will provide an average operating speed of 38 feet per minute. Propulsion system shall be spring loaded adjustable for floor variations and installed under the first moving row.
 - 3. Limit Switchers: Furnish and install both open and closed limit switches for the integral power system. The limit switchers will automatically stop integral power operation when seating has reached the fully extended or closed position.

- a. Power operation shall utilize a combination of contactors and limit switches to ensure that the wire is not energized except during keyed operation. Straight wired electric system is not allowed.
4. Electrical: Seating Manufacturer shall provide all wiring within seating bank including remote control. Provide three (3) remote control units.
 - a. Each unit shall be power operated by a 1/2 horsepower, 1725 RPM, 115 Volts, 60 Hz., single phase 1.25 service factor motor. This motor draws a service factor current of 11 amperes. Power service to run this motor is 120 volt (20 amp) single phase service. The service amperage will be 20-30 or 40 depending upon the number of motors to be operated. Motors, housing, and wiring shall be installed and grounded in complete accord with the National Electric Code.
 - b. The electrical contractor shall provide power source with no greater than 4 percent voltage drop at the seating junction box. The electrical contractor shall perform all wiring connections in junction box that is attached or part of the building.

2.6 ACCESSORIES

- A. Master Key/Hinged Skirt Boards: All skirtboards shall be hinged and each section shall have key locks with all locks keyed alike.
- B. Handicap Cutouts: Provide first tier recoverable flex rows per requirements of Americans with Disability Act (ADA) located as indicated.
- C. End Curtain: Provide closure and panels for stack and open position at each exposed bank ends. Curtain shall be manufacturer's standard vinyl end curtains.
- D. Ready Rail End Rails: Provide self-storing steel 42 inches high above seat, end rail with tubular supports and intermediate members designed with 4 inches sphere passage requirements.
- E. Removeable Scorer's Table: One 8 foot by 18 inch by 30 inch scorer's table. Table top shall be gray textured blow molded polymer 2 inches in thickness with eased edges. Provide shop finished integral folding 16 gage cantilevered C-style leg design.

2.7 SHOP FINISHES

- A. Understructure: For rust resistance, steel understructure shall be finished on all surfaces with grey "Dura-Coat" enamel. Understructure finish shall contain a silicone additive to improve scratch resistance of finish. Tubular steel that cannot be painted inside is unacceptable.
- B. Wear Surfaces: Surface subject to normal wear by spectators shall have a finish that does not wear to show different color underneath:
 1. Steel nosing and rear risers shall be pregalvanized with a minimum spangle of G-60 zinc plating. Painted nosings or risers are unacceptable.
 2. Decking shall have surfaces to receive a sealer coat with use surfaces to receive which gloss clear urethane finish. Painted decks are unacceptable.

- C. Railings: Steel railings shall be finished with powder coated semi-gloss black enamel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
- B. Beginning of installation means acceptance of existing project conditions.

3.2 INSTALLATION

- A. Install bleachers in locations indicated on reviewed and accepted shop drawings in accordance with manufacturers written instructions.

3.3 PROTECTION

- A. Protect bleachers from damage until Substantial Completion of Contract under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

Section 12 93 00
LANDSCAPE SITE FURNISHINGS

PART 1 GENERAL

1.0 RELATED DOCUMENTS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:
01 30 00 – SUBMITTALS
01 43 39 – MOCK-UPS
01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
01 40 00 – QUALITY REQUIREMENTS; Testing and inspection.

1.1 DESCRIPTION OF WORK

- A. Provide all materials and equipment, and do all work necessary to furnish and install the site furnishings (trash and recycling units, bike racks, flag poles) as indicated on the Drawings and as specified.

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
1. Section 03 30 00 - CAST-IN-PLACE CONCRETE; Poured in place concrete.
 2. Section 05 50 00 - METAL FABRICATIONS
 3. Section 06 20 14 - EXTERIOR WOOD SEATING; Custom exterior wood seating.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standard conflict with other specified requirements, the most restrictive requirements shall govern.

1. American Society for Testing and Materials (ASTM):

A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
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1.4 SUBMITTALS

- A. Provide submittals in accordance with Section 01 30 00 – Submittal Procedures.
- B. Product data:
1. Manufacturer's standard product literature.

2. Shop drawings listing model, size, and details.
 3. Installation instructions.
 4. Maintenance instructions.
 - C. Submit powder coat finish samples for approval.
- 1.5 QUALITY ASSURANCE
 - A. Manufacturer Qualifications:
 1. Minimum 15 years' experience in the manufacture of site seating.
 2. Forest Stewardship Council ("FSC") Certified Supplier. Provide manufacturer's FSC certification number.
- 1.6 DELIVERY, STORAGE AND HANDLING
 - A. Handle products in accordance with manufacturer's instructions.
 - B. Store products in manufacturer's original packaging until ready for installation.
 - C. Protect products from impacts and abrasion during storage.
- 1.7 WARRANTY
 - A. Provide manufacturer's standard warranty:
 1. Warranty terms: one year from date of invoice against defects in materials and workmanship.

PART 2 - PRODUCTS

2.0 MATERIALS

- A. Materials shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. The materials provided shall be of a type with proven satisfactory usage for at least 2 years.

2.1 FASTENERS AND HARDWARE

- A. Provide manufacturer's standard materials and accessories as required for assembly of units and as indicated on the assembly drawings. Provide unexposed aluminum, stainless steel or steel plates, angles, and supports as required for complete assembly. Separate dissimilar materials to prevent electrolytic action.

1. Fasteners and metal components shall be cadmium-plated steel or steel hot-dipped galvanized in accordance with ASTM A 153.
2. Exposed metal surfaces shall be finished in accordance with the requirements of Section 05 50 00 Metal Fabrications.

2.2 TRASH and RECYCLING RECEPTACLES

A. Trash receptacles to be:

- a. The Windsor Dual litter receptacle by Thomas Steele, 1080 Uniek Drive Waunakee, WI , 800-241-2205, www.thomassteele.com with Vertical Straps: 3/8 x 1" Steel Bar; Rings: 5/8" Dia. Solid Rod; Base: 1/4 x 2" Steel Bar. 42 gallon capacity. Plastic liners also included. Dome lids, powder coat color: grey.
- b. The Universal Trash/Recycling Receptacle by Forms + Surfaces, 800-451-0410, www.forms-surfaces.com. Split side opening: standard opening/round opening with Litter and Recycling graphics. 36 gallon Stainless Steel satin finish.
- c. Sage Dual by Victor Stanley, PO Drawer 330, Dunkirk, MD 800.368.2573, www.victorstanley.com. Side door, side deposit trash and recycling station. (2) 45 gallon receptacles including high density plastic liners, perforated steel panels, color Grey.

Quantity: 8 Dual Units

2.3 BIKE RACKS

- ### A. Bike rack shall be Park-a-Bike, U CS200 Circle Series, Hoop Runner Bike Racks, by Ground Control Systems, Arc Rack by Dero, 888-337-6729, www.dero.com or Orion by Belson Outdoors, www.belson.com 800-323-5664 or approved equal.

Quantity =15.

1. Material: Galvanized steel.
2. Mounting: Surface Mount
3. Tubing: 2" Square

2.4 FLAGPOLES

- ### A. Flagpoles shall be by Perfection Fence; United States Flag; Embassy Flag or approved equal

1. Material: Aluminum
2. Height: 30' ht. with tapered column
3. Rigging: Internal Halyard, revolving truck
4. Finish: Powder coat, color Silver/Grey
5. Required grounding
6. Install base per manufacturer's instructions

2.5 RAISED BED PLANTER

- ### A. Raised bed planters for Community Gardens shall be the following quantities and sizes or approved equal:

1. Quantity of eleven (11) at size sixty (60) inches wide, twenty four (24) inches deep, and thirty three (33) inches tall.
2. Quantity of ten (10) at size sixty (60) inches wide, thirty (30) inches deep, and thirty three (33) inches tall.

- B. Raised bed planters for Community Gardens shall be one of the following vendors:
1. Urban Long by Victor Stanley, www.victorstanley.com, Custom sizes as shown on Drawings. Recessed panel, false bottom constructed of fire retardant resin. Surface mounted, color: Metallic warm silver.
 2. Astor Planter by Planterworx.com, 718-963-0564, Custom sizes as shown on Drawings. .125" Stainless Steel ASTM A240, T-304, T-316L in Stainless Steel Satin Brushed finish.
 3. Urban Collection by Tournesol Siteworks; 800-542-2282, www.tournesolsiteworks.com, Custom sizes, FRP planters with T-O smooth finish in MMP Aluminum color.

PART 3 - EXECUTION

3.0 GENERAL

- A. The Contractor shall verify that finished grades and other operations affecting mounting surfaces have been completed prior to the installation of site furnishings. Site furnishings shall be installed plumb and true, at locations indicated, in accordance with the approved manufacturer's instructions.

3.1 ASSEMBLY AND ERECTION OF COMPONENTS

- A. Items shall be shipped knocked-down (KD), ready for site assembly. Packaged components shall be complete including all accessories and hardware. New parts shall be acquired from the manufacturer; substitute parts will not be accepted unless approved by the manufacturer. When the inspection of parts has been completed, the site furnishings shall be assembled and anchored according to manufacturer's instructions or as indicated. When site furnishings are assembled at the site, assembly shall not interfere with other operations or pedestrian and vehicular circulation.

3.2 ANCHORAGE, FASTENINGS, AND CONNECTIONS

- A. Furnish metal work, mounting bolts or hardware in ample time for securing into concrete or masonry as the work progresses. Provide anchorage where necessary for fastening furniture or furnishings securely in place. Provide, for anchorage not otherwise specified or indicated, slotted inserts, expansion shields, and power-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish the fastenings to which they are applied. Conceal fastenings where practicable.

3.3 TESTING

- A. Each site furnishing shall be tested to determine a secure and correct installation. A correct installation shall be according to the manufacturer's recommendations and by the following procedure: The Contractor shall measure the physical dimensions and clearance of each installed site furnishing for compliance with manufacturer's recommendations and as indicated. Site furnishings which do not comply shall be reinstalled. Fasteners and anchors determined to be non-compliant shall be replaced. A written report describing the results of the testing shall be provided.

END OF SECTION

Section 13 12 60
PRESS BOX

Part 1 GENERAL

1.0 GENERAL PROVISIONS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:

- 01 30 00 – SUBMITTALS
- 01 43 39 – MOCK-UPS
- 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
- 01 40 00 – QUALITY REQUIREMENTS; Testing and inspection.

1.1 DESCRIPTION OF WORK

- A. Furnish a prefabricated, modular press box integrated with the Grandstand Bleacher system at dimensions shown on Drawings to accommodate 8 people.

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
- 1. Section 03 30 01 Concrete Sitework: foundations 1.
 - 2. Division 05 50 00 Structural Steel
 - 3. Section 13 34 16 Grandstand

1.3 SUBMITTALS

- A. Bidders with any deviation from the specifications must comply with the following requirements seven (7) days prior to the bid opening.
- 1. Plan view and wall section showing complete detail of layout, connection and trim detail.
 - 2. Schedule of Work Experience, including names of contacts and phone numbers; 10 jobs minimum within the last five (5) years.
 - 3. List of three (3) similar jobs within the past two (2) years – should owners (3 persons maximum) request a site visitation to these jobs, it will be at the bidder's expense.
 - 4. Resume including Corporate Officers, Sales Representatives, Technical Advisor, Project Manager, and Job site Superintendent.
 - 5. Project schedule, including phasing with other trades and designation for all tasks, milestone dates for drawing submittal, fabrication time, key material delivery dates and designated dates of installation.
 - 6. Shop drawings stamped and signed by a Professional Engineer licensed in the state of Massachusetts.

1.4 DESIGN CRITERIA

- A. All material and workmanship shall be in accordance with the applicable state building code/ IBC current edition and NFPA.
- B. All electric components shall be UL listed.
- C. Design Loads:
- 1. Live Load 100 psf Floor
 - 50 psf Roof (w/ filming platform)
 - Wind 20 psf on vertical surfaces
- D. Design Classification
- 1. Use Group: B, Construction Type: V-B

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in modular building construction with experience in manufacturing press boxes.
- B. Engineer qualifications: The press box shall be approved by a registered professional engineer in the state of Massachusetts.
- C. Warranty: Press box shall be guaranteed for one (1) year against defective material or workmanship. Damage resulting from abnormal use or vandalism is not applicable.

PART 2 – PRODUCTS

2.1 FLOOR CONSTRUCTION

- A. Bottom Board: 1/2" CCX foundation grade treated plywood. Industrial grade asphalt-based pint. Continuous aluminum vents on 8' centers.
- B. Insulation: 6" R-19 fiberglass batts, with vapor barrier.
- C. Joists: 2" x 6" #2 SYP, on 16" centers, longitudinal framing.
- D. Decking: 3/4" SturdiFloor, underlayment grade, tongue and groove fir plywood, (Index 24 in O.C.)
- E. Covering: 1/8" Armstrong Excelon vinyl composition tile.
- F. Molding: 4" Thermoplastic rubber base molding by Roppe.

2.2 WALL CONSTRUCTION

- A. Studs: 2" x 4", #2 or better SPF, on 16" centers, BOCA framing.
- B. Bottom Plate: 2" x 4" #2 or better SPF.
- C. Top Plates: (2) 2" x 4" #2 or better SPF.
- D. Headers: As span and design load requires
- E. Ceiling Height: 8'-2" x 8'-0", front to back with Drop Ceiling at 7'-2" x 7'-0"
- F. Covering: 5/8" vinyl-faced gypsum panels, Class A, F.S.R.
- G. Insulation: 3-1/2" R-13 fiberglass batts with vapor barrier.
- H. Sheathing: 1/2" CDX plywood.
- I. Siding: Metal Sales "U-Panel" .026-gauge ribbed steel panels with Kynar 500 finish.

2.3 ROOF CONSTRUCTION

- A. Joists: 2" x 8", #2 SYP, 16" O.C. spacing.
- B. Overhang: 15-1/2" over front wall; 6" over rear wall. .019 metal fascia with perforated vinyl soffit panels.
- C. Ceiling: US gypsum 24" X 24" suspended ceiling system, class A rated
- D. Insulation: 6" R-19 fiberglass batts with vapor barrier.
- E. Decking: 3/4" tongue & groove oriented strand board (Index 24" O.C.).
- F. Covering: .060 single-ply EPDM rubber membrane, fully adhered.

2.4 WINDOWS

- A. Soft-Lite "Barrington DSL7 HS", Double horizontal slider windows w/ extruded vinyl frames, AAMA Structural Rating, w/ 3/4" insulated Low-E, Argon filled tempered glass w/ removable insect screens.
- B. Interior Windows to be 1/4" tempered safety glass fixed pan with stained jambs and casing

2.5 DOORS

- A. 18GA. Insulated hollow metal door with 16GA. Steel wrap around frames, viewing window, vinyl weather-stripping, aluminum threshold and lever handled lock sets.
- B. Doors (Interior) - 1-3/8" Solid-core stained birch with stained birch wood jambs and casing and passage lever handled hardware.

2.6 ELECTRICAL

- A. Service Entrance Panel: Square D Q0124M100 with Main Disconnect; rated at 120/240v, single phase, 100 amp capacity.
- B. Receptacles: Pass & Seymour 125 volt/15 amp duplex, spec-grade, along the rear wall. Wiremold 5400 Series two-piece multi-channel, dual voltage, non-metallic surface raceway along front wall below scorer's counter, outlets on 48" centers.
- C. Lighting: Lithonia 2'x4' troffer 120v (2) 4' tube recessed fluorescent light with parabolic diffusers.
- D. Circuits: All branch circuit wiring is minimum #12 THHN encased in EMT thin wall conduit or MC Cable.
- E. (2) BERKO #BKOC2543W 3'-0" electric baseboard heater with thermostat.
- F. (1) roof electrical access- 2x4 waterproof fascia mounted junction box with 3/4" EMT conduit to entrance panel

2.7. SCORERS' COUNTER

- A. 20" deep x 1 1/2" Clear Anodized finish aluminum countertop with rounded front nose. Mounted on brackets spaced a minimum of 32".

2.8. CAMERA DECKS

- A. Hatch: Bilco Model #NB-50 2'6" x 4'6" aluminum roof hatch
- B. Ladder (Aluminum): Alaco #370 70 degree ships ladder.
- C. Upgraded Roof Surface: .060 polyester reinforced skid and spike resistant PVC membrane, fully adhered.
- D. Railing Mounts: 1/2" galvanized threaded bolts & nuts through roof fascia on 48" centers along perimeter edge of roof. Railing mounts cannot be placed on the roof surface.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation: Shall be handled directly by the manufacturer or by a factory certified installation subcontractor.
- B. Erect per plans, shop drawings, and specifications.

3.2 CLEANING

- A. Clean all surfaces according to manufacturer's recommendations.
- B. Remove all packaging and construction debris.

END OF SECTION

PRESS BOX

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Section 13 34 16
GRANDSTAND SEATING SYSTEM

PART 1 - GENERAL

1.0 RELATED DOCUMENTS

- A. Division 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
Division 01 - GENERAL REQUIREMENTS, as listed in the Table of Contents, including but not limited to the following sections, shall be included in and made a part of this Section:
- 01 3033 00 – SUBMITTALS **PROCEDURES** (Final Bid Package)
 - 01 43 39 – MOCK-UPS
 - 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
 - ~~01 40 00 – QUALITY REQUIREMENTS; Testing and inspection.~~ (Final Bid Package)

1.1 DESCRIPTION OF WORK

- A. This section includes complete services to provide a permanent grandstand seating system of size and capacity, and with features indicated on the drawings.
- B. Complete Scope of Work in this bid package includes the following:
- 1. AISC certified steel fabrication
 - 2. Galvanized structural steel finish
 - 3. Fully Closed Aluminum Double Lock Welded Deck System
 - 4. Enhanced slip and stain resistant deck finish
 - 5. Powder coated Aluminum Risers

1.2. RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
- 1. Division 31 Site Construction
 - 2. Division 03 Concrete Sitework: foundations
 - ~~3. Division 05 Structural Steel~~
 - 4.3. Section 131260 Press Box (Final Bid Package)

1.3 REFERENCES

- A. MA State Building Code 8th 9th Edition (Final Bid Package)
- B. AISC Steel Manual Thirteenth Edition
- C. ACI 318-05
- D. Aluminum Association Design Manual 2010
- E. ASTM E985
- F. AWS D1.2

1.4 PERFORMANCE REQUIREMENTS

- A. Design Loads
- Dead Load 6 psf
 - Live Load 100 psf – limited to L/200
 - Wind Speed Design per local wind speeds & building codes
 - Sway Load 24 plf per row parallel to seatboards
 - Sway Load 10 plf per row perpendicular to seatboards
 - Seismic Load Design per local seismic conditions
 - Guardrail Loads 50 plf distributed or 200 lb concentrated load applied in any direction

GRANDSTAND SEATING SYSTEM

B. Serviceability Requirements

Deflection shall be limited to $L/200$ of the span for all structural members.

1.5 DISSIMILAR MATERIALS

A. Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

1.6 SITE REPRESENTATION

A. Qualified representative of the grandstand manufacturer must be onsite at all times during installation of the grandstand.

1.7 QUALITY ASSURANCE

A. AISC Certification: All structural steel shall be fabricated in an American Institute of Steel Construction (AISC) certified plant that is certified "BU" at the time of the bid.

B. Installation: Installation shall be performed by factory trained and certified representatives of the grandstand manufacturer. Installer shall have completed at least three installations of similar size. Documentation shall be provided upon request.

1.8 SUBMITTALS

A. Fabricator AISC Certificate of compliance with the Standard for Steel Building Structures

B. Shop Drawings: Complete detailed drawings prepared, signed and sealed by a Registered Professional Engineer (P.E.) licensed in the State of Massachusetts.

Include:

- a. Detailed and dimensioned plans for all components including press box.
- b. Seating plan indicating aisles, walkways, seating sections and exits and showing exit calculations using appropriate tables and requirements of the Massachusetts State Building Code.
- c. Press Box Drawings showing all construction, framing, exterior sheathing, insulation, interior drywall, flooring assembly, roofing system, filming platform, electrical plans, etc.
- d. Sections and details showing complete methods of assembly and anchorage.
- e. Footings and foundation sizes and types and relationships to finish grade in compliance with construction documents. Exposed portions of foundations, pier height and top elevations shall be subject to customer approval.
- f. Engineering calculations.

C. Qualifications of Professional Engineer who seals the shop drawings and calculations.

D. Material Samples:

- a. Decking material showing texture and blasted and anodized finish
- b. Risers showing anodized finish
- c. Seatboards showing anodized finish
- d. Mesh infill panels for railings

NOTE: Delays caused by required resubmittals due to noncompliance with the specification shall not extend any milestone date in the contract. The contractor is responsible for complying with all aspects of this specification.

1.9 WARRANTY

Product shall be guaranteed for (5) years on the structure and (3) years on the finishes together with labor. Damage resulting from abnormal use or vandalism is not covered.

PART 2 - PRODUCTS

2.1 MANUFACTURER

Manufacturer shall be :Dant Clayton Corporation, 1500 Bernheim Lane, Louisville, Kentucky 40210; (800) 626-2177; GT Grandstands, 2810 Sydney Road, Plant City, FL 33566; (866) 550-5511, www.gtgrandstands.com; National Recreation Systems, 1300-D Airport North Office Park, Fort Wayne, IN 46825, 888.568.9064, www.bleachers.net or approved equal

2.2 PRODUCT COMPONENTS

A. Fully Closed Welded Deck System for Bleachers

- a. Bleacher system is to accommodate 1500 seats.
- b. The decking system has two components. The first component is a one-piece factory welded deck panel constructed of multiple aluminum extensions welded together. All extrusions shall be welded in a single pass with 0.040" diameter 4043 welded wire using Orion Gas to insure uniform shape, dimension and appearance. The decking system shall be fixed with a 1% slope to the front to enhance water drainage. The decking system shall be attached by concealed clips and galvanized hardware. Decking extrusions are to be 1 3/4" vertically with a .078" wall thickness and are interlocked horizontally prior to welding using a tongue and groove connection without seams. Deck finish shall be blasted and anodized. Sample shall be approved by the architect.
- c. The second component is a one-piece aluminum riser extension that has a male-female connection at the top with the welded deck panel and a shingled overlap connection at the bottom with the welded deck panel. The riser shall be an anodized finish approved by the architect.
- d. The decking system shall run from raker beam to raker beam. There shall be a 1/2" gap at joint of the welded deck panels to allow for expansion and contraction of the aluminum due to temperature variations.
- e. The joint of the welded deck panel shall be covered with a 4" wide aluminum extrusion joint cover.
- f. The ends of decking system will be finished with a one-piece aluminum angle end cap.

B. Bench Seating

1. Seat Brackets for benches shall bolt directly to the steel understructure.
2. Seats shall be 6063-T6 extruded aluminum with a fluted surface and a minimum of 4 vertical legs. The exact size of seatboard is 2" x 10" x .080" wall thickened at the joints and weighing 1.9 lbs. per foot with 1" radius comfort curve front edge.
3. Mounting brackets: 3/16" thick A36 steel plate, plasma cut, bent and galvanized.

C. Understructure shall consist of an open span I-Beam understructure.

1. Longitudinal bays may include angle cross bracing provided that it does not interfere with building entrances or vomitories.
2. All beams and columns may be made of either wide flange or tube shapes.

3. All steel shall be sized to support the most conservative of the loads in the table above, and the loads in the local building code. Sizes shown on the drawings are the minimum sizes that must be provided.

D. Guard Railing

1. Vertical guardrail structural supports shall be 2.8" X 2.0" X .1888" aluminum rectangular tube or 6061-T6 aluminum angle alloy of equivalent strength. Guardrails shall have structural support on each leg of fencing at all 90 degree turns. Tension bars are not acceptable.
2. Guardrail horizontal and vertical framing members will be 1 5/8" O.D. anodized aluminum pipe.
3. Infill mesh panels shall match the gauge and openings of pedestrian guardrail panels as described in Section 323115 Metal Fences and Gates and in the Drawings.

E. Ramps

1. Ramps shall be configured as shown on drawings.
2. Ramps shall have a maximum slope of 1:12, and shall have the same guard railing as the rest of the grandstand.
3. Ramps shall have a minimum post spacing of 3 ft and a maximum post spacing of 9 ft.
4. Material finishes shall match those on the grandstand.

F. Stairs

1. Stairs shall consist of L3x3x1/4" legs with a sloping steel channel supporting the treads. Each tread shall be supported by a clip angle bolted to the sloping channel. Minimum vertical leg spacing is 3 ft. Maximum spacing is 9 ft.
2. Guardrail on the stairs shall match the guardrail on the stand.
3. Material finishes shall match those on the grandstand.

G. Hand & Grab Rails

1. Hand and Grab Rails shall be located in all areas required by building code.
2. Hand and Grab Rails shall be 1-15/16" O.D. extruded aluminum pipe.
3. Two-Line mid-aisle handrails shall be located in all interior aisles. All mid-aisle rails shall feature internal fittings for both lines of rail. External fittings are not permitted.

H. Press Box: See Section 131260 Press Box

1. Press Box structure is to be integrated within the Bleacher System at the dimensions shown on the drawing. This structure shall accommodate 8 people and have the approximate dimensions:
 - a. 30' long x 8' w x 8' tall with a sloped roof.
2. There shall be a viewing platform on the roof of the Press Box which extends the entire space with a 42" guardrail at the roof perimeter.
3. Viewing platform can be accessed by an internal ships ladder or other stair means of access.
4. There shall be 2 doors to access the main level of the building from the plaza elevation.
5. The structure shall have lighting and power standard with press box structures.
6. Viewing Platform shall have power for camera and other equipment.
7. Structure shall be insulated, weather tight and include heat and air conditioning.
8. Manufacturer is to produce drawings for review including all of the above elements.

2.3 MATERIALS

A. Structural Steel

1. All detailing, fabrication, and erection shall be completed in accordance with the AISC Steel Construction Manual 13th Edition. All fabrication shall be completed in an AISC certified facility as described in Para. 1.8 A.
2. Structural Steel shall be ASTM A572 multi-certified grade 50. Miscellaneous steel shall be ASTM A36.

3. Bolts & Nuts: All bolts 5/8" diameter and larger shall meet ASTM A325. All bolts 1/2" and small shall meet ASTM A307.
4. All welds shall conform to ANSI/AWS D1.1. Electrodes shall be E70xx

B. Aluminum

1. All footboards & seatboards shall consist of 6063-T6 aluminum alloy with minimum yield strength of 25 ksi.
2. All straight grab & hand rails shall consist of 6061-T6 aluminum alloy with minimum yield strength of 35 ksi.
3. All bent grab & hand rails shall consist of 6061-T4 aluminum alloy with minimum yield strength of 21 ksi.

C. Rip Rap Stone below Grandstand System

1. Stone for this WORK shall be hard angular quarry stones and have a percentage of wear of not more than 50 at 500 revolutions as determined by ASTM C 535. The least dimension of any piece of stone shall be not less than 1/4 its greatest dimension. Rounded boulders or cobbles shall not be used. Stones shall meet the following gradation requirement for Class I specified:
 - a. No more than 10% of the stones by total weight shall weigh more than 50 pounds per piece, and no more than 50% of the stones by total weight shall weigh less than 25 pounds per piece.
2. Filter cloth shall conform to standard requirements. Contractor is to submit product information for review.
3. Depth of rip rap shall be minimum 6".

2.4 FINISHES

A. Structural Steel

1. Structural steel shall be coated with a minimum of 2 oz. hot dipped galvanized in accordance with ASTM 123-A with a minimum galvanized film thickness of 3.3 mils. Zinc shall be 98% purity, certified with written test results based on samples taken from the tank.
2. All structural steel fasteners shall be galvanized.

B. Aluminum

1. WALKING SURFACE REQUIREMENT - All aluminum footboards shall have an enhanced stain resistant and slip resistant finish at all locations intended for use as a walking surface.
 - a. This finish shall be produced by the bleacher manufacturer in addition to the mill extrusion process and shall be uniform in appearance. The slip and stain resistant surface treatment must be achieved with a blasted and anodized process. The metallic media blasting option must be performed in a controlled factory environment to ensure consistency. Hand processes or sand blasting is strictly prohibited as they produce an inconsistent finish that is not uniform in appearance or performance.
 - b. This surface finish shall prevent oxidation staining and be resistant to staining from beverage spills and organic matter. Oxidation staining prior to warranty expiration shall be grounds for product replacement at the manufacturer's expense.
 - c. This surface finish shall exhibit enhanced slip resistance beyond the mill extrusion process, resulting in an improved coefficient of friction under wet conditions in all directions of travel.
 - d. Untreated mill finish aluminum with raised extruded "flutes" or "ribs" does not meet this requirement.
2. All seat boards shall have a clear anodized finish.
3. All Riser boards shall have a color powder coat finish in color selected by architect from manufacturer's standard color choices.
4. Powder coat system shall meet or exceed the following test requirements:

- a. Direct Impact Resistance: ASTM D 2794-93, up to 140 in.-lbs.
- b. Flexibility: ASTM D 522-93, Method B, 100% Pass
- c. Pencil Hardness: ASTM D 3363-93a, 3H-4H
- d. Crosshatch Adhesion: ASTM D 3359-97, Method B, 5B, 100% Pass
- e. Salt Spray Resistance: ASTM B 117, plus 1,000 hours
- f. Humidity Resistance: ASTM D 2247, plus 1,000 hours

5. All hand and Grab Rails shall be clear anodized

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation shall be handled directly by the manufacturer or by a factory-certified installation subcontractor.
- B. Structure shall be erected in accordance with plans, shop drawings, and specifications.
- C. Rip Rap material shall be installed below structure prior to construction per details shown in the Specifications and Drawings.

3.2 CLEANING

- A. Clean all surfaces after erection, in accordance with manufacturer's recommendations.
- B. Remove and properly dispose of all packaging and construction debris.
- C. Do not use acid solution, steel wool or other harsh abrasives.

END OF SECTION

Section 07 71 00
LOWER FIELDS HEAVY DUTY ALUMINUM BLEACHERS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The General provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements and Division 01 General Requirements, apply to work specified in this section.
- B. Carefully examine all of the Contract Documents for requirements which affect the work of this Section. The exact scope of work of this section cannot be determined without a thorough review of all Specification Sections and other Contract Documents.
- C. Refer to Drawings for further definition of location, extent, and details of work described in this Section.
- D. Cooperate and coordinate with other trades in executing work as described in this Section.
- E. Where referred to, Standard Specifications, Recommendations of Technical Societies, and/or Manufacturer's Associations, plus Codes of Federal, State, and Local Agencies shall include all amendments current as of date of issue of these Specifications.
- F. In all cases when conflicts exists between information contained in this Section and in other parts of the Contract Documents, the Contractor shall assume (for budgeting purposes) that the most expensive solution is required, until notified otherwise.
- G. In all cases, when a question exists to the level of quality required for a product and/or installation, the highest quality is required.

1.2 SCOPE OF WORK

- A. Provide engineering and design, fabrication and materials, freight, installation and supervision to provide a new fully code compliant non-elevated fully back access aluminum bleacher system, separate aluminum stair from the back plaza level to the bleacher slab in accordance with the following specifications. This includes providing and installation of all decking and riser mounted seating, mounting hardware and materials necessary to develop a fully code compliant spectator seating area. It also includes back row level ADA seating deck and associated companion seating, stair aisle railings, and side fence barriers. Aluminum front row barrier railings with 34" height at seating and 42" height at ends of aisles shall also be included. All upper plaza, deck level, and stairs from the seating deck aluminum stairs to the field level walk railings and barrier railings shall be aluminum and also be part of this Work.
- B. Engineering layout and concrete coring for railings and barrier railings shall be part of this Work.

1.3 RELATED WORK

- A. The following related work is to be performed under designated sections.
 - 1. 03 30 00 – Cast-in-Place Concrete

1.4 REFERENCED STANDARDS

- A. Referenced standards are as follow:
1. ASTM A572-50 Structural Steel Hot-Dipped Galvanized after fabrication to ASTM A123 Specifications.
 2. ASTM A307 - Specification for Carbon Steel Bolts and Studs (Ordinary Bolts)
 3. ASTM A325 - Specification for Carbon Steel Bolts (High Strength Bolt)
 4. All Bolts and Nuts to have a Hot-Dipped Galvanized Finish.

1.5 SUBMITTALS/APPROVALS

- A. The following vendor(s) have been pre-approved and shall be used as the Grandstand Supplier for the project:
1. Dant Clayton Company, Inc.
- B. Samples
1. Seatboard.
 2. Footboard.
 3. Riserboard.
 4. Handrail support post and cap.
 5. 12" x 12" chain link
 6. Deck attachment support member.
 7. Deck members with internal splice/expansion sleeve.
 8. Intermediate step.
 9. Seat mounting bracket - "L" type to meet Massachusetts State Building Code and NFPA codes.
 10. Thermoplastic polyester resin powder coat protection for steel and aluminum.
 11. Color chips.
 12. Seat module with fasteners - for reserved seating section.
 13. Fencing materials
 14. Aluminum stair tread and riser
- C. Seating and stair plan indicating aisles, walkways, seating sections, and exits.
- D. End elevations/sections indicating rise and row depth, deck configuration and method of attachment, railings, size of framing members, vertical aisle details and walkways.
- E. Calculations by a Registered Professional Engineer with State Licensure for the grandstands and footing system.
- F. Schedule of work experience, including names and telephone numbers of contacts; 10 projects minimum of equal value.
- G. List of three similar jobs – should the Owners (three persons maximum) request a site visitation to these jobs, it will be at the bidders expense.
- H. Resume including Corporate Officers, Sales Representatives, Technical Advisor, Project Manager, and Job Site Superintendent.

- I. Project schedule, including phasing with other trades and designation for all tasks, milestone dates for drawing submittal, fabrication time, key material delivery dates and designated dates of installation.

1.6 DESIGN CRITERIA

- A. All material and workmanship shall be in accordance with the following:

1. IBC current edition
2. NFPA-101 and NFPA-102 Current Edition.
3. AISC Manual of Steel Construction, 9th Edition.
4. ACI Building Code for Reinforced Concrete.
5. Aluminum Association of America.
6. Federal Handicap Legislation.
7. Massachusetts Access and Barriers Guidelines and Regulations
8. 780 CMR: Massachusetts Amendments to the International Building Code 2009 Chapter 16: Structural Design

- B. Federal Specification LP-390C, Type 1, Class M, Grade 2, Category 3

- C. Design Loads: (Vendor to confirm the following meets current codes where applicable)

Dead Load	6 psf	seat and footboards, risers, steel framing, etc.
Live Load	120 psf	to structural members. All stringers and girders shall be limited to L/240 for maximum vertical live load deflection.
	120 plf	Seatboards
	120 plf	Footboards, deflection shall be limited to L/240
Wind (local conditions)	120 psf	On projected vertical surface. System must be completely self-supporting as it relates to wind loads and must not rely on adjacent retaining walls for wind load support. Wind uplift load to be applied under empty and fully live loaded conditions.
Sway	24 plf	Per lineal foot of seat, parallel to seat run
Sway	10 plf	Per lineal foot of seat, perpendicular to seat
Guardrail	50 plf any direction	200 point load at middle span any direction

- D. Design, fabricate and install steel railings and guards to comply with Federal, State and Local Building and Accessibility Codes. Unless otherwise indicated in these specifications, guard railings and handrails shall be designed and constructed to the structural loading conditions set forth in the table below, without exceeding the allowable design working stress of the materials, anchorage devices and connecting devices utilized. Each load shall be applied to produce the maximum stress in each respective component.

- E. Understructure Criteria:

The following criteria are used to establish a minimum requirement for strength, stiffness and rigidity of the understructure components.

1. Moment of inertia of .822
2. Section modulus of .576
3. Radius of gyration of .975
4. Axial loading of .889

- F. General: The structure shall be properly braced for wind and construction loads until all structural elements are secured. Understructure shall be of open bay design allowing the ability to construct a building underneath. Individual stringer columns will not be allowed. Lateral and longitudinal bays shall be cross-braced as required. Guardrails shall be of adequate size, location, and height to meet specified codes and designed to carry required loads. Exit stairs and intermediate aisle stairs shall be completely closed, in the direction of travel, and shall have a maximum rise of 5" and a minimum tread of 13".
- G. Code Compliance: Submittals shall be based upon specifications contained in the bid documents as modified to meet current codes. Interpretation of code compliance for life safety issues is provided in design documents. Any change to design must have approval prior to bid. Design changes to reduce aisles or exits is not allowed. Design change to seatboard bracket support is not allowed. Bidder is responsible to meet the code interpretation provided in bid drawings and specifications. Calculations that demonstrate code compliant egress and exit of aisles, stairs, and ramps is a required submission with approval drawings.
- H. Deflection: Structural elements shall be sized to limit the live load deflections to 1/200 of the span.
- I. Foundations: Foundations will be designed and installed by the grandstand vendor

1.7 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of five (5) years experience in fabrication of grandstand structures.
- B. Engineering Qualifications: Grandstand and foundation system shall be designed by a licensed professional engineer registered within the state, and all submittals shall bear said professional's seal. Calculations are required and must show all vertical and lateral loads and must show positive and negative biaxial stress ratios. These calculations must be submitted with the approval drawings.
- C. Product Liability Certificate of Insurance coverage for life of the product shall be provided.
- D. Warranty: Product shall be guaranteed for one year against defective materials and workmanship.

PART 2 - PRODUCTS

3.1 MANUFACTURERS

- A. The acceptable manufacturers are:
1. Dant Clayton Company, Inc.
 2. GT Grandstands, Inc.
 3. E & D Specialty Stands.

Listing as acceptable manufacturer does not remove responsibility to meet specifications and Codes.

3.2 MATERIALS

A. Understructure:

1. Understructure shall be fabricated from 6061-T6 alloy aluminum extrusions.
2. Vertical members shall be 2 7/8" o.d. tubing or L3.5x3.5x1/4 angles.
3. Horizontal members and footboard supports shall be 3" x 2 7/8" channel or L2.5xL2.5x3/16 angles.
4. Cross braces and diagonals shall be 2 1/4" x 7/8" channel or 2"x2" angle.
5. Handrail support shall be 2 5/8" o.d. tubing.
6. The understructure shall be assembled from the above items in an interlocking design and 7/16" x 3 1/2" hot-dipped galvanized bolts.
7. The structure shall be designed so that in the event of accidental damage, the sub-component parts may be replaced using common hand tools. Field welding for repair purposes shall not be considered.
8. Primary structural members shall be bolted together, or calculations must be submitted verifying that the structure has taken into account the weakening of aluminum associated with welding per 2005 AA ADMI sections 7.2.1 and 7.2.3

B. Guardrail Systems:

1. Guardrails shall be of anodized aluminum extruded channel, 3 x 2 7/8", 6061-T6 alloy, anodized to clear 204R1.
2. The guardrail system shall be of interlocking design with positive through bolt fastening. The top rail shall be designed to fully cover the rail support posts for a totally snag-free area and eliminate the potential of sharp edge contact with the spectators.
3. Grab rails shall be extruded aluminum pipe of 6063-T6 alloy, 1 – 1 5/16" o.d.
4. Chain link fence shall be 2" mesh, 6 gauge vinyl coated fabric.
5. The guardrail system shall be provided in two heights, 34" to top railing and 42" to top railing. The 34" guardrail system shall have 30" chain link fence fabric from the centerline of top rail to the centerline of the bottom rail. The 42" guardrail system shall have 30" chain link fence fabric from the centerline of 34" rail to the centerline of the bottom rail. Above the 34" rail shall be two additional railings. One set at the 42" code height, and one set midway between the 34" and 42 inch height rails. This configuration allows the use of 30 in fabric for the full length of the assembly and compliance with the 4" opening rule above the fabric.

C. Hand & Grab Rails

1. Hand and Grab Rails shall be located in all areas required by building code.
2. Hand and Grab Rails shall be 1 15/16" O.D. extruded aluminum pipe.
3. Two-Line mid-aisle handrails shall be located in all interior aisles. All mid-aisle rails shall feature internal fittings for both lines of rail. External fittings are not permitted.

D. Extrusions

1. Seats shall be 6063-T6 extruded aluminum with a fluted surface and a wall thickness of .080". Seatboards shall be a minimum of 10" wide actual, with outside legs of 1 3/4" actual vertical height, and shall have two internal legs with a vertical height of 2 5/8". Seatboards shall attach with one 3/8" diameter bolt and shall be designed for positive physical fastening. Bolt clips, bolt runners or other friction type fastening devices are not acceptable. Seats shall be black color coated.
2. Footboards shall be 6063-T6 extruded aluminum with a fluted surface and a wall thickness of .078". Each footboard member (individually) shall have two internal legs with 2 1/8" actual vertical height. All footboards shall attach without the use of hardware. Attachment shall be

positive snap and interlock with the support structure. Use of bolt clips, bolt runners, or other friction type fastening devices is not acceptable.

3. Riser boards shall be 6063-T6 extruded aluminum and shall be pre-treated and powder coated in color selected by architect from manufacturers standard color options.

E. Walking Surface Requirement

1. All aluminum footboards shall have an enhanced stain resistant and slip resistant finish at all locations intended for use as a walking surface.
 - a. This finish shall be produced by the bleacher manufacturer in addition to the mill extrusion process.
 - b. This surface finish shall prevent oxidation staining. Oxidation staining prior to substantial completion shall be grounds for product replacement at the manufacturer's expense.
 - c. This surface finish shall exhibit enhanced slip resistance beyond the mill extrusion process, resulting in an improved coefficient of friction under wet conditions in all directions of travel. Enhanced slip resistant surface shall be sand blasted and anodized surfaces or approved equal.
 - d. Untreated aluminum planks with raised extruded "flutes" or "ribs" does not meet this requirement.

F. Aisles:

Aisles shall be designed so that all vertical and horizontal areas are fully enclosed.

G. Hardware:

1. Bolts used for field installation shall be hot dipped galvanized.
2. Primary connections, i.e. seat, cross brace, handrail (rail and posts) shall be made with minimum of 3/8" diameter hardware. Vertical mounting components shall be hot dipped galvanized. Mounting brackets for vertical mounting: 3/16" thick A36 steel plate, plasma cut, bent and galvanized. Mounting for vertical mounting applications at the companion seating shall be post mount type installations with base closure cap.
3. End Caps – All end caps (seatboard) shall be cast aluminum.

2.3 REINFORCED CONCRETE AND SITE WORK

- A. All concrete work and materials shall be in accordance with ACI 318.
- B. Cast-in-place concrete shall have minimum compressive strength of 4,000 psi at 28 days.
- C. All exterior concrete shall be air-entrained to 6% +/- 1%.
- D. Reinforcing steel shall be in accordance with ATM A615, grade 60.
- E. Embedment of reinforcing in concrete shall be as follows, unless otherwise noted on drawings:
 1. 3" Placed directly against earth.
 2. 2" Concrete poured against forms and exposed to weather.
 3. 1 1/2" Columns to ties.
- F. A geotechnical survey and report is required for all excavated foundation holes. A copy of the geotechnical report will be submitted to the Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be handled directly by the manufacturer or by a factory-certified installation subcontractor.
- B. Seating shall be erected in accordance with plans, shop drawings, and specifications.
- C. The seat units shall require a minimal expenditure of time to be assembled for use. It shall not be necessary to assemble an under frame, distinguish between separate understructure rail lengths, or select different hardware.
- D. Field cut of seating shall be cut using a miter saw and not freehand. All cuts shall be at the appropriate angle for clean and uniform installation of each panel or deck section. Where decking or panels meet angled surfaces, the cut shall match the angle. All exposed cut surfaces shall have end finish plates to cover sharp edges.

Field cuts shall be cut to account for thermal expansion and or contraction. All areas subject to expansion shall have suitable steel plate slip plates covering gaps.

- E. Site preparation is not included in this specification.

3.2 CLEANING

- A. Clean all surfaces after erection, in accordance with manufacturer's recommendations.
- B. Remove and properly dispose of all packaging and construction debris.

END OF SECTION 13 34 19

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Section 13 48 00
SOUND, VIBRATION AND SEISMIC CONTROL

PART 1 – GENERAL

1.1 SUMMARY

- A. General: The work of this Section consists of sound, vibration and seismic control where shown on the Drawings, as specified herein, and as required for a complete and proper installation.
- B. Furnish and install the following:
 - 1. Sound isolation hangers.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4*, *LEED for Building Design and Construction*, *LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 09 64 66 - WOOD ATHLETIC FLOORING.

1.3 REFERENCES

- A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.
 - 1. All applicable federal, state and municipal codes, laws and regulations regarding flammability and smoke generation of interior finishes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.
- B. Sequencing:
 - 1. Field Measurements

- a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
- b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.5 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications and installation instructions.
 2. Certificates: Wood products lacking acceptable documentation for the following will be rejected and their removal required.
 3. Shop drawings: Large scale plans showing isolation hangers and adjacent construction.
 4. Samples: One of each item specified herein.
 5. LEED Submittal Requirements:
 - a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Maintenance Material Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Clearly label and package extra materials securely to prevent damage.
 1. Extra Stock Materials: Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance, 10 of each device as installed including all accessories, anchors and fasteners.

1.6 QUALITY ASSURANCE

- A. General: Notify the Architect where conflicts apply between referenced standards, specified materials, and methods of construction.
- B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer.
- C. The resilient isolation hangers and perimeter isolation material shall be designed and fabricated at the facilities of a nationally recognized manufacturer having a minimum of five years of experience in furnishing similar materials.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
 - 2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
 - 2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.
- C. Packaging Waste Management: Comply with disposal and recycling requirements specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- D. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.8 WARRANTY

- A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.
- B. Manufacturer Warranty: In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
 - 1. Kinetics Noise Control, Inc. Dublin, Ohio.
 - 2. Mason Industries, Inc. Inc., Hauppauge, NY.
 - 3. Acoustical Solutions, Inc., Richmond, VA.

2.2 DESCRIPTION

- A. General Description: Resiliently suspended assemblies where shown on drawings, shall be isolated from the building structure in order to increase their ability to reduce airborne sound and impact noise transmission.

2.3 COMPONENTS

- A. Sound isolation hangers Type 1: Isolation hanger shall be a combination high-deflection steel spring in series with a resilient, molded neoprene noise and vibration isolation pads at top and bottom of the hanger bracket. The steel spring and neoprene pads shall be incorporated into a stamped steel hanger assembly that resiliently supports the isolated ceiling
1. Hanger assembly bracket shall allow fifteen (15) degrees of vertical alignment of the suspension member without making metal-to-metal contact between both suspension and hanger assembly members. The hanger shall incorporate welded eyebolts top and bottom. The welded eyebolts shall be used both to suspend the hanger by wire and to suspend drywall ceiling grid. The isolation hanger deflection shall be selected by the manufacturer to provide a maximum natural frequency of 4.4 Hz. The steel spring element shall have a minimum Kx to Ky of 1 at its 1 inch rated deflection.
 2. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Kinetics Noise Control, Inc. Dublin, Ohio product: "Muta Hanger".
- B. Sound isolation hangers Type 2: Pre-compressed neoprene rubber and spring isolation hanger designed for high frequency sound waves and low frequency vibrations. Size hangers as recommended by manufacturer for anticipated ceiling load.
1. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Kinetics, Noise Control Inc., product, "IsoGrid Ceiling Hanger".
- C. Acoustical Pads:
1. Material: Neoprene, with air voids for resiliency.
 2. Size: 4 by 4 inches by 3/4 inch (20 mm) thickness.
 3. 50 durometer, Shore A.
 4. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Mason Industries, Inc., Hauppauge, NY., product "Super W Neoprene Waffle" Pads".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.
1. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

- A. Protection of In-situ Conditions: During the operation of work of this Section, protect surrounding materials and finishes against undue soilage and damage by the exercise of reasonable care and precautions. Clean, or repair all in situ surfaces which are soiled or otherwise damaged by Work of this Section, to match indicated profiles and specified finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

3.3 INSTALLATION

- A. All sound isolation materials specified herein, including those installed under other sections of the specifications, shall be in accordance with procedures submitted by the isolation material manufacturer, and approved by the Architect.
- B. All building components supported by the isolation hangers shall be free from rigid contact with any part of the non-isolated building structure to prevent unwanted sound flanking.

3.4 FIELD QUALITY CONTROL

- A. Field inspection will be performed under the provisions of Section 01 45 00 - QUALITY CONTROL.

3.5 CLEANING

- A. Upon completion of the work of this Section in any given area, remove tools, equipment and all rubbish and debris from the work area; leave area in broom-clean condition.
- B. Waste Management:
 - 1. Recycle or dispose of off-site waste materials and trash at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
 - 2. Dispose of liquid waste in accordance with all applicable regulations. Consult all regulations (federal, provincial, state, local) or a qualified waste disposal firm when characterizing waste for disposal. Contact manufacturer for MSDS sheets for product information, and recommendations for proposal disposal. Utilize licensed waste disposal companies as may be required, the following phone numbers for national companies are provided for the Contractor's convenience only.
 - a. Safety Kleen, Plano TX., (telephone 800-669-5740).
 - b. Clean Harbors, Norwell MA., (telephone 800-422-8998).
 - c. Phillip Services Corporation (PSC), Houston TX., (telephone 800-726-1300).

3.6 PROTECTION

- A. Protect finished work under provisions of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

End of Section

Section 14 24 24
HOLELESS HYDRAULIC ELEVATORS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING TRADE CONTRACT BIDS:

- A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.
- B. Trade contract bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the City of Worcester, Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 at time and place stipulated in the "Invitation to Bid/Notice to Contractors". The following shall appear on the upper left hand of the envelope:

Name of Trade Contract Bidder: Print Name of Trade Contract Bidder
Project: SOUTH HIGH COMMUNITY SCHOOL
Trade Contract Bid for Section: 14 24 24 – HOLELESS HYDRAULIC ELEVATORS

- C. Each trade contract bid submitted for work under this Section shall be on forms furnished by the City of Worcester as required by Section 44F of Chapter 149 of the General Laws, as amended. Trade contract bid forms may be obtained at the Department of Public Works and Parks, Architectural Division, 50 Skyline Drive, Worcester, MA 01605 in person, or by written request.
- D. Trade contract bids filed with the City of Worcester shall be accompanied by a BID BOND or CASH or CERTIFIED CHECK or a TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company payable to the City of Worcester in the amount of five (5) percent of the bid. A trade contract bid accompanied by any other form of bid deposit than those specified will be rejected.
- E. Additional Requirements:
1. Trade contract bidder's attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
 2. Each trade-contract bidder shall list in Paragraph E of the "Form for Trade Contract Bids" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the

following classes of work shall be listed in Paragraph E under the conditions indicated herein.

Class of Work	Reference Specification	Paragraphs

- F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
1. The Work of this Trade Contract is shown on the following Drawings: EX1.0, EX2.0, EX2.1, EX2.2, EX2.3, EX2.4, L1.0, L2.0, L2.1, L2.2, L2.3, L2.4, L2.5, L2.6, L2.7, L2.8, L2.9, L3.0, L3.1, L3.2, L3.3, L3.4, L3.5, L4.0, L4.1, L4.2, L4.3, L5.0, L5.1, L5.2, L5.3, L5.4, L5.5, L5.6, C1.0, C2.0, C3.0, C3.1, C3.2, C3.3, C3.4, C4.0, C4.1, C4.2, C4.3, C4.4, C5.0, C5.1, C5.2, C5.3, C5.4, C6.0, C6.1, C6.2, C6.3, C7.0, C7.1, C7.2, C7.3, C7.4, C8.0, C8.1, C8.2, C8.3, C8.4, C9.0, C9.1, C9.2, C9.3, C9.4, C10.0, C10.1, C10.2, C10.3, C10.4, C10.5, C10.6, C10.7, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6, C11.7, CA1.1, CA2.1, CA2.2, CA3.1, CA3.2, CA3.3, CA4.1, CA4.2, CA4.3, CA4.4, CA4.5, CA4.6, CA4.7, CA4.8, AD1.0, A1.1, A2.1, A2.2, A2.3, A2.4, A2.5, A3.0, A3.0A, A3.1, A3.2, A3.3, A3.4, A3.5, A3.6, A3.7, A3.8, A3.9, A3.10, A3.11, A3.12, A3.13, A3.14, A3.15, A3.16, A3.17, A3.18, A4.1, A4.2, A4.3, A4.4, A4.5, A4.6, A4.7, A4.8, A4.9, A4.10, A4.11, A4.12, A5.0, A5.1, A5.2, A5.3, A5.4, A5.5, A5.6, A5.7, A5.8, A5.11, A5.12, A6.1, A6.2, A6.3, A6.4, A6.5, A6.6, A6.7, A6.8, A6.11, A6.12, A6.13, A6.14, A6.15, A6.16, A6.17, A6.18, A6.21, A6.22, A6.23, A6.24, A6.25, A6.26, A6.27, A6.28, A6.29, A6.31, A6.32, A6.33, A6.34, A6.35, A7.1, A7.2, A7.3, A7.4, A7.5, A7.6, A7.7, A8.1, A8.2, A8.3, A8.4, A8.5, A8.6, A8.7, A8.8, A8.9, A8.10, A8.11, A8.12, A8.13, A8.14, A8.15, A8.16, A8.17, A8.18, A8.19, A8.20, A8.21, A8.22, A8.23, A8.24, A8.25, A8.26, A8.27, A8.28, A8.29, A9.1, A9.2, A9.3, A9.4, A9.5, A9.6, A10.1, A10.2, A10.3, A10.4, A11.1, A11.2, A11.3, A12.1, A12.2, A12.3, A12.4, A12.5, A12.6, A12.7, A12.8, A12.9, A12.10, A12.11, A12.12, K1.1, K1.2, K1.3, K2.1, K2.2, K2.3, K2.4, K3.1, K3.2, K3.3, K3.4, K3.5, K3.6, K3.7, K4.1, K4.2, K4.3, K4.4, K4.5, K4.6, K5.1, K5.2, K6.1, K6.2, K6.3, K6.4, K6.5, S1.1, S1.2, S1.3, S3.1, S3.2, S3.3, S3.4, S3.5, S3.6, S3.7, S3.8, S3.9, S3.10, S3.11, S3.12, S3.13, S3.14, S3.15, S3.16, S4.11, S4.12, S4.13, S4.14, S4.15, S4.16, S4.17, S4.18, S4.19, S4.20, S4.21, S4.22, S4.23, S4.24, S5.1, S5.2, S5.3, S5.4, S5.5, S5.6, S6.1, S7.1, S7.2, S7.3, S7.4, S7.5.
 2. Related items which may require coordination or impact work of this trade are shown on the following Drawings: FP1.1, FP1.2, FP1.3, FP1.4, FP4.1, FP4.2, FP4.3, FP4.4, FP4.5, FP4.6, FP4.7, FP4.8, FP4.9, FP4.10, FP4.11, FP4.12, FP7.1, P2.1, P2.2, P2.3, P2.4, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6, P3.7, P3.8, P3.9, P3.10, P3.11, P3.12, P3.13, P3.14, P3.15, P3.16, P4.1, P4.2, P4.3, P4.4, P4.5, P4.6, P4.7, P4.8, P4.9, P4.10, H3.1, H3.2, H3.3, H3.4, H3.5, H3.6, H3.7, H3.8, H3.9, H3.10, H3.11, H3.12, H3.13, H3.14, H3.15, H3.16, H4.1, H4.2, H4.3, H4.4, H4.5, H4.6, H4.7, H4.8, H4.9, H4.10, H4.11, H4.12, H5.1, H5.2, H5.3, H6.1, H6.2, H6.3, H7.1, H7.2, H7.3, AV0.0, AV0.1, AV0.2, AV3.3, AV3.4, AV3.5, AV3.7, AV3.8, AV3.9, AV3.10, AV3.18, AV4.5, AV4.6, AV4.7, AV4.8, AV4.9, AV5.0, AV5.1, AV5.2, AV5.3, AV5.4, AV5.5, AV5.6, AV5.7, AV6.1, AV6.2, AV6.3, AV7.1, AV7.2, TL1, TL2, TL3, TL4, TR1, TR2, TR3,

TR4, E0.1, E0.2, E0.3A, E0.3B, E0.3C, E0.3D, E0.4A, E0.4B, E0.4C, E0.4D, E0.4E, E0.4F, E0.5, E0.6, E0.7, E0.8, E0.9, E1.1, E1.2, E1.3, E1.4, E1.5, E1.6, E1.7, E1.8, E1.9, E1.10, E1.11, E1.12, E1.13, E1.14, E2.1, E2.2, E2.2A, E2.3, E2.4, E2.4A, E2.4B, E2.5, E2.6, E2.7, E2.8, E2.9, E2.10, E2.11, E2.12, E3.1, E3.2, E3.3, E3.4, E3.5, E3.6, E3.7, E3.8, E3.9, E3.10, E3.11, E3.12, E3.13, E3.14, E3.15, E3.16, E3.17, E3.18, E4.1, E4.2, E4.3, E4.4, E4.5, E4.6, E4.7, E4.8, E4.9, E4.10, E4.11, E4.12, E5.1, E5.2, E5.3, E5.4, E5.5, E5.6, E5.7, E5.8, E5.9, E5.10, E5.11, E5.12, E5.13, E5.14, E5.15, E5.16, E6.1, E6.2, E6.3, E6.4, E6.5, E6.6A, E6.6B, E6.7A, E6.7B, E6.7C, E7.0, E7.1, E7.2, E7.3, E7.4, E7.5, E7.6, E7.7, E8.0A, E8.0B, E8.0C, E8.0D, E8.0E, E8.0F, E8.0G, E8.1A, E8.1B, E8.2A, E8.2B, E8.2C, E8.2D, E8.3A, E8.3B, E8.3C, E8.3D, E8.4A, E8.4B, E8.4C, E8.5A, E8.5B, E8.5C, E8.5D, E8.6A, E8.6B, E8.7, E8.8A, E8.8B, E8.8C, E9.01, E9.02, E9.03, E9.04, E9.05, E9.06, E9.07, E9.08, E9.09, E9.10, E9.11, E9.12, E9.13, E9.14, E9.15.

3. The complete List of Drawings for the Project is provided in Section 00 01 15.
4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 SUMMARY

- A. Furnish and install: Two hydraulic elevators, work includes, but is not limited to:
 1. Commercial, standard pre-engineered hydraulic passenger elevators\.
 2. Elevator car enclosure, hoistway entrances and signal equipment.
 3. Jacks.
 4. Operation and control systems.
 5. Accessibility provisions for physically disabled persons.
 6. Sill support angles.
 7. Elevator pit ladder.
 8. Door hardware.
 9. Equipment, machines, controls, systems and devices as required for safely operating the specified elevator at its rated speed and capacity.
 10. All other devices, materials and accessories for operation, dispatching, safety, security, leveling, and alarms, as required to complete the elevator installation.
- B. Furnish the following products to be installed under the designated Sections:
 1. Inserts required to be cast into concrete: installed by Section 03 30 00 - CAST-IN-PLACE CONCRETE.
 2. Guide rail brackets and inserts for placement in masonry: installed by Section 04 20 00 - UNIT MASONRY.
- C. Place, install and build-in, as work progresses, the following products and materials furnished under the indicated Sections:
 1. Integrated card readers furnished by Section 28 13 00 – ACCESS CONTROL.
 2. Cylinder for key control of elevator call buttons.

- D. Provide 12 month maintenance and call back services for elevator equipment furnished.
- E. Alternates: Special attention is called to the fact that it shall be the responsibility of the Construction Manager, Trade Contractors and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the Construction Manager, Trade Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated Construction Manager, Trade Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

1.4 EXAMINATION OF SITE AND DOCUMENTS

- A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager's or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.
- B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to ADVERTISEMENT FOR BIDS for time and date.

1.5 RELATED REQUIREMENTS

- A. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT: Procedural and administrative requirements for construction and demolition recycling.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's *LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools* rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- D. Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS.
- E. Section 01 91 19 – EXTERIOR ENCLOSURE COMMISSIONING REQUIREMENTS.
- F. Section 03 30 00 - CAST-IN-PLACE CONCRETE.
 - 1. Structural concrete for elevator motor and pump foundation.
 - 2. Concrete elevator pit foundation.
 - 3. Embedded concrete anchorage.

4. Sump pit.
- G. Section 04 20 00- UNIT MASONRY:
 1. Shaft wall construction
 2. Grouting thresholds and door frames.
 3. Installation of hoist beams.
- H. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Hoistway framing, and overhead hoist beam.
- I. Section 08 71 00 - DOOR HARDWARE: Furnishing cylinder for key control of elevator call buttons to be installed under this section.
- J. Section 09 29 00 - GYPSUM BOARD: Gypsum board wall finish at concrete masonry unit shafts.
- K. Section 09 68 13 – TILE CARPETING: Carpet in elevator cab(s).
- L. Section 10 44 00 - FIRE PROTECTION SPECIALTIES: Fire extinguisher in elevator machine room.
- M. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING:
 1. Ventilation system and temperature control of elevator machine room.
- N. Division 26 - ELECTRICAL:
 1. Temporary power supply.
 2. Fused mainline switches or circuit breakers in the machine room, including feeders from the mainline switch to controllers or starters.
 3. Electrical service to elevators, including fused disconnect switches.
 4. Heat and smoke sensing devices.
 5. Convenience outlets and illumination in machine room, hoistway and pit.
 6. Telephone connection to elevator machine room.

1.6 REFERENCES

- A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 1. ANSI A117.1 - Providing Accessibility and Usability for Physically Handicapped People.
 2. ANSI/ASME A17.1 - American Standard Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks
 3. ANSI/ASME A17.2 - Inspection of Elevators, Escalators, and Moving Walks.
 4. NFPA 70 - National Electrical Code.
 5. NFPA 80 - Standard for Fire Doors, Fire Windows.
 6. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

7. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
8. UL: Applicable requirements for motors, switches and other electrical components.
9. All applicable federal, state and municipal codes, laws and regulations for elevators, including barrier-free requirements.

1.7 DEFINITIONS

- A. All terms in this Section shall have meaning defined in the Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks, ANSI A17.1, including all revisions and modifications thereto. In all cases where a device or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

1.8 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
 2. Be responsible for establishing locations and levels for all work of this Section, except such parts as may be delivered to others and set by them. In such cases assist them in properly locating said parts.
- B. Pre-installation conference:
 1. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 04 20 00 - UNIT MASONRY.
- C. Sequencing:
 1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
 2. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.
 3. Field Measurements
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
 - b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.
 4. Provide all items which will require building into the concrete and masonry in sufficient time as not to delay the progress of the respective trades. Should such items not be delivered in time to be built in, pay all costs for the required cutting and installation work.
- D. Scheduling:

1. Coordinate the work of this Section with the respective trades responsible for installing inserts and anchorages furnished by this Section; make arrangements for delivery, receipt and installation of inserts and anchorages to prevent delay of the Work.

1.9 SUBMITTALS

- A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:
 1. Literature: Manufacturer's product data sheets, specifications, performance data, for elevator components furnished, including:
 - a. Manufacturer's product data sheets, specifications, performance data, for elevator components furnished, including:
 - 1) Signal and operating fixtures, operating panels, indicators.
 - 2) Cab design, dimensions, layout and components.
 - 3) Cab and hoistway door and frame details.
 - 4) Electrical characteristics and connection requirements.
 2. Manufacturer's warranties: Manufacturer's written warranty, countersigned by the installer, clearly stating all terms and conditions of the warranty, and covering all materials and workmanship provided for a period of not less than two years from date of Substantial Completion of the General Contract.
 3. Shop drawings: Large scale drawings indicating general arrangement for all elevator equipment; indicate on drawings:
 - a. Motor and hydraulic pump, valves controller selector, governor and other component locations.
 - b. Car, machine beams, guide rails, buffers, and other components in hoistway.
 - c. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
 - d. Individual weight of principal components; load reaction at points of support.
 - e. Loads on hoisting beams.
 - f. Landing heights, entrance dimensions, and tolerances of shaft dimensions.
 - g. All electrical characteristics and requirements for the elevator equipment, including heat release and regenerative amps and KW.
 - h. Cab dimensions, show a horizontal emergency stretcher inside of cab with equivalent ease, verifying compliance with MA 524 CMR 17.40 requirements.
 4. Manufacturer's certification: Manufacturer's letter, certified by a Notary Public, stating that no proprietary equipment, as is specified under Part 2 - Products, will be used in the installation.
 5. Samples: Sample chips of all finishes in elevator car, hoistway doors and frames, and all available colors for, plastic laminate, paints, and finishes, for selections by the Architect.
 6. LEED Submittal Requirements:

- a. Submit completed LEEDv4 Materials Reporting for applicable material requirements as required in Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS. Submit all required backup documentation.
 - b. The work of this Section includes responding to Architect or Contractor requests for additional information or product data and may be required following initial Green Building Certification Institute (GBCI) review of LEED Application.
 - c. Product substitution requests are subject to additional LEED submittal requirements including, but not limited to, Environmental Product Declarations (EPD), Health Product Declarations (HPD), and General Emissions Testing. See Section 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES.
- B. Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:
1. Parts list and wiring diagrams: Upon completion of the installation, submit four (4) copies of a complete parts list and as-built wiring diagrams for controller and elevator system and maintenance instruction manual.
 2. Provide technical information for servicing operating equipment.
 3. Include legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment, and changes made in the work. List symbols corresponding to identity or markings on machine room and hoistway apparatus.
 4. Provide one copy of master electric and hydraulic schematic and one copy of lubrication chart, each framed with clear glass; mounted on machine room wall in location designated by Architect.
 5. Manufacturer's written installation warranty and maintenance contract as specified herein below.

1.10 QUALITY ASSURANCE

- A. In the interest of unified responsibility, the elevator installer shall be either the actual equipment manufacturer or a firm fully authorized by the manufacturer of the proposed equipment to install the equipment; regularly engaged in the business of manufacturing, installing, and servicing elevators of the type and character required under this Section, with all major components, including the entire power unit, controller, hydraulic cylinder, door operators, signal fixtures, and other major items, being the products of a single elevator manufacturer.

1.11 REGULATORY REQUIREMENTS

- A. All designs, clearances, construction, workmanship, and material, unless specifically excepted, shall be in accordance with the requirements of:
1. ASME/ANSI A17.1 Safety Code for Elevators and Escalators.
 2. Commonwealth of Massachusetts Regulation 521 CMR: ARCHITECTURAL ACCESS BOARD, as amended.
 3. Commonwealth of Massachusetts Regulation 524 CMR - State Elevator Code as amended.
 4. City of Worcester applicable rules and regulations.
 5. NFPA 70 National Electrical Code.

6. NFPA 80 Fire Doors and Windows.

- B. Work shall be in full conformance with all regulations for the physically handicapped in accordance with ANSI Publication No. A-117.1 Part 4, Series 4.12, Design of Barrier-Free Facilities, the recommendations of United States Department of Justice, N° 28 CFR Part 36 - AMERICAN WITH DISABILITIES ACT Public Law 101-336, (referred to herein as "ADA"), local authorities, and all other governing bodies which may have jurisdiction.
- C. Work shall conform to seismic requirements of ANSI A17.1 for Seismic Zone 2.
- D. Products requiring electrical connection: Listed and classified by Underwriter's Laboratories, Inc., as suitable for the purpose specified and indicated.

1.12 PERMITS, TESTS AND INSPECTIONS

- A. Obtain and pay for all necessary municipal and State elevator inspections and permits; make all tests as required by the regulations of such authorities. The capacity and operational performance tests shall be conducted in the presence of the Architect and the code enforcement officer, after completion of the installation.
- B. Obtain certificate of compliance from authority having jurisdiction indicating approval of installed elevator.

1.13 WARRANTY

- A. Provide 2 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include all materials and workmanship for the elevator system and its installation. countersigned by the elevator installer, clearly stating all terms and conditions of the guarantee, and covering all materials and workmanship provided for a period of not less than two (2) years from date of Substantial Completion of the General Contract.

1.14 MAINTENANCE

- A. Provide under separate contract with the City of Worcester an installers maintenance contract under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, for a period equal to warranty. Maintenance contract shall include the following:
 - 1. 24-hour emergency callback service for the equipment.
 - 2. Monthly examinations of the installation during regular working hours by trained employees of the elevator manufacturer.
 - 3. All necessary adjusting, greasing, and oiling.
 - 4. Cleaning supplies and parts necessary to keep the equipment in proper operation, except any parts needed due to misuse, accident, or neglect caused by other trades.
- B. Repair work shall be carried out only by the elevator installer's personnel, using only standard parts furnished by the elevator manufacturer. Maintenance shall be carried out directly by the elevator installer and shall not be assigned or transferred to any agent.

PART 2 - PRODUCTS

2.1 MANUFACTURE AND TYPE

- A. Specified manufacturer and model: To establish a standard of quality, design and function desired, Drawings and specifications have been based on ThyssenKrupp Elevator Company, Memphis TN., Product: "Endura 35".
- B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following:
1. ThyssenKrupp Elevator Company, Memphis TN.
 2. Otis Elevator Company, Farmington CT.
 3. Schindler Elevator Corporation, Gettysburg PA.
- C. Proprietary equipment: No proprietary equipment shall be used in the installation. All equipment included in the elevator installation shall have repair or replacement parts readily accessible to the general elevator trade. Without limitation, this shall include diagnostic tools, solid state boards and controller components required for the complete maintenance of the installed equipment.
1. Any costs incurred for changes in the work from that shown on the Drawings, including work of this and other Sections, due to the requirements of the particular equipment furnished thereunder are the sole responsibility of the Elevator manufacturer.
- D. Barrier free design: Provide for handicapped requirements in accordance with ANSI Publication No. A-117.1 Part 4, Series 4.12, Design of Barrier-Free Facilities, Americans with Disabilities Act (ADA) and all applicable Federal, State and Local codes.
- E. E1 elevator characteristics:
- | | |
|------------------------------|--------------------------------------|
| Load (rated capacity): | 3,500 pounds. |
| Canoter Speed: | 80 feet per minute. |
| Operation: | Simplex collective, selective. |
| Rise: | As indicated on Drawings |
| Number of Stops: | 3 |
| Height under ceiling: | 7'-4" |
| Clear car inside: | 6'-8" wide by 5'-5-1/2" deep. |
| Car door type: | Single speed front and rear opening. |
| Hoistway dimension: | 8'-8" wide by 7'-10-3/4" deep. |
| Hoistway entrance: | 3'-6" wide by 7'-0" high. |
| Motor: | 20 horsepower |
| Power supply , (heavy-duty): | 480 volts, 3 phase, 60 hertz |
| Lighting supply: | 120 volts, 1 phase, 60 hertz |
| Signal supply: | 120 volts, 1 phase, 60 hertz |
- F. E2 Building elevator characteristics:
- | | |
|------------------------|---------------------|
| Load (rated capacity): | 4,500 pounds. |
| Canoter Speed: | 80 feet per minute. |

Operation:	Simplex collective, selective.
Rise:	As indicated on Drawings
Number of Stops:	3
Height under car top:	7'-9-1/4"
Height under ceiling:	7'-4"
Clear car inside:	5'-8" wide by 7'-9-1/2" deep.
Car door type:	Single speed front opening.
Hoistway dimension:	7'-8" wide by 9'-6-1/2" deep.
Hoistway entrance:	4'-0" wide by 7'-0" high.
Motor:	25 horsepower
Power supply , (heavy-duty):	480 volts, 3 phase, 60 hertz
Lighting supply:	120 volts, 1 phase, 60 hertz
Signal supply:	120 volts, 1 phase, 60 hertz

- G. Door to Receiving Area to be key operated only.
- H. Load capacity: Safely lower, stop, and hold up to 125 percent rated load.

2.2 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed.
- B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building with steel brackets.
- D. Guide Shoes: Slide type, 80 feet per minute guides, shall be mounted on top and bottom of the car and be held in contact with the guide rail by adjustable devices.
- E. Guide Rail Lubricators: Provide a leakproof reservoir on top of upper guide shoes. Wool felt wiper shall apply an even, uniform flow of lubricant which shall thoroughly cover face of guide rail.
- F. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- G. Twin Post Jack: Jack units shall be of sufficient size to lift the gross load the height specified. Factory test jacks to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Jack unit shall consist of the following components:
 - 1. Heavy seamless steel tubing plunger accurately turned and polished.
 - 2. Internal guide bearing.
 - 3. Packing or seal of suitable design and quality.
 - 4. Stop ring shall be electrically welded to the plunger to positively prevent plunger leaving the cylinder.
 - 5. Drip ring around cylinder top.

6. Cylinder made of steel pipe and provided with a pipe connection and air bleeder.
 7. Weld brackets to the jack cylinder for supporting the elevator on pit channels. An auxiliary safety bulkhead shall be provided in the lower end of the cylinder.
 8. Jack cylinder and underground piping shall be painted to help protect it from chemical corrosion.
- H. Automatic Terminal Limits: Place electric limit switches in the hoistway near the terminal landings. Limit switches shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.
- I. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- J. Failure Protection: Design electrical control circuit so if a malfunction occurs, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will automatically descend to the lowest terminal landing. If power operated doors are used, the doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the "door open" button in the car station, shall be made inoperative.
- K. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary pipe and fittings shall connect the power unit to the jack unit. Provide proper grade oil.
- L. Emergency Terminal Stopping Device: Provide emergency terminal stopping devices for speeds over 100 FPM. The emergency terminal stopping device shall operate independently of the normal terminal stopping device if it fails to slow down the car at the terminal as intended. Stopping devices shall not be prevented from functioning by a single short circuit caused by a combination of grounds or by other conditions.
1. Normal and emergency terminal stopping devices shall not control the same controller switches unless two or more separate and independent switches are furnished, two of which shall be closed in either direction of travel to complete the circuit to the control valve solenoids in the down direction and to complete the circuit to the pump motor for the up direction of travel.

2.3 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:
1. Oil reservoir with tank cover and controller compartment with cover.
 2. An oil hydraulic pump.
 3. An electric motor.
 4. Oil control unit with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and magnetic controller.

- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
- C. Drive: Drive shall be by direct coupling with the pump and motor submerged in the oil reservoir or by multiple V-belts and sheaves of number and size to insure maximum factor of safety. Drive type shall be determined based primarily on the load on the car, travel, and speed.
- D. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall comply with specified speeds and loads.
- E. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
 - 1. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
 - 2. Up start and stop valve shall be externally adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
 - 3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
 - 4. Lowering valve and leveling valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling when slowdown is initiated.
- F. Power controller shall contain electrical contactors, electro-mechanical switches and thermal overload relays. Mount components in a NEMA 1 enclosure. Logic control system shall be microprocessor based and protected from environmental extremes and excessive vibrations.
- G. Reduced Voltage Starting: Provide a solid state starter to limit current inrush during starting and to provide gradual acceleration of the motor. Motor starting shall not be initiated by mechanical contacts. Starter shall include a current limit adjustment range of 200 percent to 450 percent of the overload adjustment range. Provide an integral fault detection and diagnostic system.
- H. Hydraulic oil to be biodegradable hydraulic oil as manufactured by:
 - 1. Environmental Lubricants
 - 2. Terresolve Technologies, Ltd.
 - 3. Greenland Corp.
 - 4. Or equal.

2.4 ELECTRICAL COMPONENTS

- A. Boxes, conduit, wiring, and devices: As required by ANSI/NFPA 70.

- B. Fittings: Steel compression type for electrical metallic tubing. Fittings with set screws are acceptable only when a separate grounding conductor is also installed across the joint.
- C. Spare conductors: Provide 10 percent extra conductors and two pairs of shielded audio cables in traveling cables. Do not parallel conductors to increase electric current capacity unless individually fused.
- D. Include wiring and connections to elevator devices remote from hoistway and between elevator machine rooms. Provide additional components and wiring to suit machine room layout.
 - 1. Do not use armored flexible metal conduit as a grounding conductor.

2.5 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening.
 - 1. Manufacturer's standard entrance design, bearing Underwriters' Laboratories "B" labels, and consisting of 14 gauge frames with 2 inch (50 mm) profile, 16 gauge doors, hangers, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
 - 2. Elevator wall interface with hoistway entrance assembly shall comply with elevator manufacturer's requirements.
 - 3. Doors: Flush construction.
 - a. Stainless steel: ASTM A 167, Type 304 stainless steel panels, No. 4 satin finish.
 - 4. Frames: Formed construction.
 - a. Stainless steel: ASTM A 167, Type 304 stainless steel panels, No. 4 satin finish.
- B. Interlocks: Equip each hoistway entrance with an Underwriters' Laboratories "B" label approved type interlock tested as required by code. Interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by code and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.
- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway sliding door.
 - 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 - 2. Hangers: Provide an adjustable slide to accommodate the up-thrust of the doors.
 - 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- D. Hoistway Sills: Extruded, with grooved surface, 1/4 inch (6.4 mm) thickness.
 - 1. Nickel-silver: ASTM B 151 nickel silver, alloy UNS C74500, polished finish.

- E. Doors and sight guards: Sight guards shall be furnished on the leading edge of the doors to conceal the hoistway beyond the doors, and finished to match door panels. Fabricate doors from 16 gage sheet steel (minimum).
- F. Sill support angles: 4 inch by 4 inch by 3/8 inch thick, shop primed.

2.6 DOOR OPERATION

- A. Door operator: Doors on the car and at the hoistway entrances shall be power-operated by means of an operator mounted on top of the car. The door operators shall have mechanically operated limits and the motor shall have positive control over door movement for smooth operation. Each car door shall be provided with a protective device.
- B. Door Protection Devices: Provide a door protection system using 40 microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen. A mechanical reopening device is not acceptable.

2.7 CAR ENCLOSURES

- A. Car Enclosure:
 - 1. Walls: reinforced 16 gauge cold-rolled steel with #4 stainless steel reveals, with applied vertical 5/8 inch thick composition board core, laminated front and back with plastic laminate. Edges of each panel shall be plastic laminate.
 - 2. Canopy: Reinforced 14 gauge cold-rolled steel with hinged exit. Finish: Factory applied powder coat.
 - 3. Ceiling: suspended downlight type, 16 gauge metal pans with LED lighting fixtures and dimmer switch. Number of downlights shall be dependent on platform size with a minimum of six.
 - a. Metal panels: Stainless steel, No. 4 satin finish.
 - 4. Cab Columns, Front, and Transom: Stainless steel, No.4 satin finish.
 - 5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic shoes sliding in a smooth threshold groove.
 - a. Door Finish: Stainless steel, No. 4 satin finish
 - 6. Cab Sills: Extruded, with grooved surface, 1/4 inch (6.4 mm) thickness.
 - a. Nickel-silver: ASTM B 151 nickel silver, alloy UNS C74500, polished finish.
 - 7. Handrail: Continuous cylindrical metal tube handrail with ends curved to the wall, nominal 1.5 inches (40 mm) in diameter, stainless steel satin finish.
 - a. Provide at rear and side walls.
 - 8. Ventilation: Two speed exhaust fan mounted on the car top.
 - 9. Pad Buttons: As manufactured by W.E. Palmer, Boston, MA., or approved equal.
 - a. Provide pad buttons on cab front(s) and walls.

- b. Provide one set of vinyl protection pads at each elevator for the project.
 - 10. Base: Stainless steel satin finish.
 - 11. Finished Floor: Provided under Section 09 68 13 – TILE CARPETING.
 - B. Car Top Inspection: Provide a car top inspection station with an "emergency stop" switch and constant pressure "up-down" direction buttons to make the normal operating devices inoperative and give the inspector complete control of the elevator. Mount the car top inspection station in the door operator assembly.
 - C. Provide rubber isolation pads to dampen vibration or noise from the oil hydraulic system being transmitted to the car frame and platform.
 - D. Manufacturer's standard protection pads (grommets); wall hooks.
- 2.8 CAR OPERATING STATION
- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in a No. 4 stainless steel permanently fixed return panel requiring no applied faceplate.
 - 1. The lowest module shall contain the "door open," "door close," "alarm" buttons and a keyed "emergency stop" switch.
 - 2. Intermediate modules shall contain floor buttons which illuminate when a call is registered and remain illuminated until the call is answered. Raised floor indications and handicap symbols shall be located immediately adjacent to the floor buttons and be fully integrated in the module design. No applied symbols or floor indications or symbols on the buttons shall be permitted.
 - 3. The next module shall contain required switches.
 - 4. The top module shall contain fire service features in accordance with ASME A17.1, Rule 211.3, including operating instructions.
 - B. Position Indicator: An electronic dot matrix position indicator. As the car travels, its position in the hoistway shall be indicated by the illumination of the alpha/numeric character corresponding to the landing which the elevator is stopped or passing.
 - C. Emergency Light: An emergency light and capacity plate. Emergency light shall illuminate automatically upon loss of the building's normal power supply.
 - D. Communications systems:
 - 1. General: Provide traveling cables with sufficient shielded wires plus two spares into the car.
 - 2. Intercom at panel connected to set number as determined by the Owner
 - 3. Emergency Communications System: Provide an emergency communications device mounted in the swing return. Emergency communications device shall comply with Americans with Disabilities Act (ADA) requirements.
 - E. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

- F. Special Accessories:
 - 1. Independent service switch.
 - 2. Inspection switch.
 - 3. Telephone jack.
 - 4. Certificate frame.
- G. Car operating fixture style: ThyssenKrupp Elevator Company, Memphis TN., "Traditional Series", (Basis of Design).

2.9 CONTROL SYSTEMS

- A. Controller: The elevator control system shall be microprocessor based and software oriented and be linked together for purposes of communication by a serial communications link. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.
 - 1. Momentary pressing of one or more buttons shall dispatch the car to the designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which the buttons are pressed. Each landing call shall be canceled when answered.
 - 2. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or "up" hall buttons have been pressed. The car shall not stop at floors where "down" buttons have been pressed, unless the stop for that floor has been registered by a car button or unless the down call is at the highest floor for which any buttons have been pressed. Pressing the "up" button when the car is traveling in the down direction shall not intercept the travel unless the stop for that floor has been registered by a car button or unless the up call is the lowest for which any button has been pressed.
 - 3. When the car has responded to its highest or lowest stop, and stops are registered for the opposite direction, its direction of travel shall reverse automatically and it shall then answer the calls registered for that direction. If both up and down calls are registered at an intermediate floor, only the call corresponding to the direction of car travel shall be canceled upon the stopping of the car at the landing.
- B. Microprocessor: Locate the main microprocessor and car controller behind the elevator swing return panel.
 - 1. Microprocessor door operator shall reside in the door operator and control all functions of the elevator door(s).
 - 2. Microprocessor selector shall reside on the car top and contain hall effect transducers that detect magnetic fields. Locate the magnetic fields on a perforated metal tape that runs the length of the hoistway.

2.10 AUXILIARY OPERATION AND CONTROLS

- A. General: In addition to primary control system features, provide the following controls or operational features for elevator.
- B. Special emergency service - Phase I: The activation of a key switch in the Level 1 hall button shall return car to Level 1 by-passing all car and hall calls. The car shall

park at Level 1 with their doors open and not respond to car or hall calls unless the SES-II key switch in the car is activated. The system shall be in conformance with the current ANSI Code, Section 211.3. The elevator installer shall furnish contacts on the elevator controller to receive alarm signals from smoke/heat detectors furnished by applicable trades. If an elevator is on Independent Service, when the elevator is recalled, a continuous buzzer will sound in the car and a warning light shall be illuminated.

- C. Special emergency service - Phase II: (SES-II) in-car control of elevator during the emergency operation, by means of a key switch in car shall be provided. Operation shall be per ANSI Code, Rule 211.3.
- D. Emergency Medical Technician (EMS) Service: Supply in accordance with the current edition of 524 CMR, Massachusetts Elevator Code, Article 17.
- E. Emergency/secondary power operation (A Building elevator):
 - 1. Emergency/Secondary power will be provided by the same feeder as normal operational power at elevator's controller.
 - 2. The system shall automatically run Elevator down to Level 1 at full speed where it shall park with doors open.
 - 3. The system shall include a manual override for the use of the City of Worcester Fire Department or emergency personnel. Work under this Section shall include manual interlocking switches, (for manual control, automatic operation and off).
 - 4. Furnish and install the necessary equipment and wiring from the respective elevator controllers to the switches in the First Floor call panel.
- F. Hydraulic rescuator (C Building elevator): Provide hydraulic rescuator system featuring the following.
 - 1. Automatically activates during power loss.
 - 2. Supplies power for rescue operation.
 - 3. Causes car to descend quickly and smoothly to lowest landing.
 - 4. Keep doors closed until proper floor level is reached.
 - 5. Automatically opens doors at lowest landing.
 - 6. Safely shut down elevator until normal power is restored.
 - 7. Automatically resets for future emergencies.
 - 8. Differentiates between actual power failure and manual operation of elevator disconnect switch.
- G. Provide emergency lighting system for car.

2.11 HALL STATIONS

- A. Hall Stations, General: Buttons shall be keyed controlled and will illuminate to indicate call has been registered at that floor for the indicated direction. Faceplates shall be stainless steel No. 4 satin finish. Provide one set of risers.
 - 1. Each terminal station shall contain one illuminating pushbutton.
 - 2. Each intermediate station shall consist of two illuminating pushbuttons, one for the up direction and one for the down position.

3. Phase 1 firefighters service keyswitch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. . Furnish and install car riding lanterns and keyed on/off switch.
 1. Faceplates shall be No. 4 satin stainless steel finish.

2.12 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. Silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blowout proof features will not be acceptable.
- B. Vibration Pads: Mount vibration pads under the power unit assembly to isolate the unit from the building structure.
- C. Sound Insulating Panels: When pump and motor are not submerged, provide panels manufactured of reinforced 14 gauge steel with 1 inch (25 mm) thick 1-1/2 pound fiberglass core attached to interior and mounted on all four open sides of the power unit frame.
- D. Sound Isolating Couplings: When pump and motor are not submerged, install a minimum of two couplings in the oil line in the machine room between pump and jack.
- E. Elevator pit ladders: Stringers 3/8-inch by 1-1/2 inch flat bar, rungs 5/8 inch diameter solid steel rods. Offset ladder from wall surface by 7 inches to centerline of rungs, with brackets.
 1. Fabricate ladders in accordance with OSHA requirements, and ANSI A14.3 standards.
- F. Elevator sill support angles: 4 by 4 inch by 3/8 inch thick, shop primed.

2.13 FINISHES, GENERAL

- A. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent and prime two coats.
- B. Machine Room Components: Clean and degrease; prime one coat, finish with two coats of enamel.
- C. Galvanized Surfaces: Clean with neutralizing solvent; prime with two coats.
- D. Aluminum: Nickel silver finish.
- E. Wood Surfaces not Exposed to Public View: One coat primer and one coat enamel.
- F. Baked Enamel on Steel: Clean and degrease metal surface; apply one coat of primer sprayed and baked; two finish coats of enamel sprayed and baked.
- G. Stainless steel: Number 4 brushed finish.

- H. Elevator pit ladders: Assembled elevator pit ladders in finish selected by Architect from manufacturer's standard finishes.

2.14 SCAFFOLDS AND STAGING

- A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.
 - 1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contract requiring such scaffolding.
 - 2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
 - 3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.

2.15 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all surfaces, and required embedded anchorage devices, and verify that they are in proper condition to receive the work of this Section. Verify that field measurements are as indicated on approved shop drawings.

3.2 PREPARATION

- A. Arrange for temporary electrical power for installation work and testing of elevator components.

3.3 INSTALLATION

- A. Perform the installation in accordance with the approved shop drawings and the manufacturer's written instructions, ANSI/ASME A17.1 and those standards required by authority having jurisdiction, and with the additional requirements specified herein.
- B. Install system components. Connect equipment to building utilities. Install piping between hoistway plunger and pump unit.

- C. Furnish and install all internal and operational wiring, conforming to the requirements of the National Electrical Code, as necessary to connect the operating buttons and switches, from the control board to the power unit. Except for short lengths of flexible conduit to moving apparatus, ensure that all wiring is contained in rigid conduit or electrical metal tubing.
- D. Mount motor and pump unit on vibration and acoustic isolators, on bed plate and concrete pad. Place unit on structural supports and bearing plates. Securely fasten to building supports. Prevent lateral displacement.
- E. Accurately machine and align guide rails. Form smooth joints with machine splice plates. Install guide rails using threaded bolts with metal shims and lock washers under nuts. Compensate for expansion and contraction movement of guide rails.
- F. Bolt or weld brackets directly to structural steel hoistway framing. Chip and clean field welds of oxidation and residue, wire brush and spot prime with two coats of primer.
- G. Hoistway entrances: Coordinate the entrance work with that of the trades responsible for furnishing and installing the structural enclosure. Ensure that the entire front wall of the hoistway is left open (or a rough opening is provided which is 12 inches greater in width and 6 inches greater in height than the finished opening) until the hoistway entrances have been installed.
 - 1. Install the hoistway entrances in perfect alignment with the guide rails, after guide rails have been installed and aligned. Interface the hoistway entrances with the surrounding conditions as indicated on the approved shop drawings.
 - 2. Refer to Section 04 20 00 – UNIT MASONRY for placement and grouting of elevator door frames into masonry shaft wall work, and installation of hoistway beams.

3.4 TOLERANCES

- A. Guide rail alignment: Plumb and parallel to each other with 1/8 inch.
- B. Cab movement on aligned guide rails: Smooth movement, with no objectionable lateral or oscillating movement or vibration.

3.5 TESTS AND ADJUSTMENTS

- A. In addition to other requirements, tests, inspections, and remedies, specified herein, perform the following:
 - 1. After completion of the installation, and prior to the date of Substantial Completion of the General Contract, make necessary arrangements with the Architect, and, in the presence of the Architect, conduct a running speed test with the full maximum load on the elevator, to ensure that the installed elevator meet all specified requirements for speed, capacity, and other requirements contained in this Section.
 - 2. In the event that the equipment does not meet all requirements of this Section, promptly remove from the premises all work determined by the Architect to be non-conforming. Promptly replace and re-execute the condemned work in accordance with the Contract Documents, bearing all expenses and costs therefor, including the costs of other trades as needed to restore related work destroyed or damaged by such removal and replacement work performed.

3.6 CLEANING

- A. After all work under this Section has been completed and satisfactorily tested, remove all applied packing labels from the various surfaces, thoroughly clean and polish all plastic laminate, metal and prefinished surfaces. Touch up all scratches, abrasions, and other surface defects in the prefinished surfaces, using the same material, color, and gloss as used in the prefinishing system.
- B. Upon completion of the work of this Section, remove tools and all rubbish and debris from the work area; leave area in broom-clean condition.

End of Section