PROJECT MANUAL - Volume 2 of 3

Wilmington Elementary School

320 Salem Street, Wilmington, Massachusetts, 01887

Design Development - March 20, 2026

Dore & Whittier Architects Inc. Project Number: 23-0847

Awarding Authority / Owner
Town of Wilmington, Wilmington Public Schools

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Dore & Whittier Architects Inc.

Geotechnical Consultant
Lahlaf Geotechnical Consulting

Civil Consultant
CDW Consultants, Inc.

Landscape Consultant
Terraink

Structural Consultant
Engineers Design Group

Plumbing and Fire Protection Consultant
Akal Engineering, Inc.

HVAC and Electrical Consultant
GGD Consulting Engineers, Inc.

Geoenvironmental Consultant
PEER Consultants, P.C.

Door Hardware Consultant
Allegion, PLC

Owner's Project Manager
LeftField Project Management

Construction Manager
Fontaine Brothers, Inc.

Sustainable Design Consultant
The Green Engineer

Environmental / HAZMAT Consultant
United Environmental Consultants

Technology Consultant
Edvance Technology Design

Acoustical Consultant
Acentech

Foodservice Consultant
Crabtree McGrath Associates, Inc.

Cost Estimating
PM&C

Traffic and Site Survey Consultant
Nitsch Engineering

DORE + WHITTIER

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Project Name: Wilmington Elementary School
Dore & Whittier Architects Inc. Project Number: 23-0847

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_____ _____

Donald M. Walter Date

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END OF SECTION

SECTION 02 28 20

ASBESTOS ABATEMENT

PART I - GENERAL

1.01 - RELATED DOCUMENTS

A. All of the Contract Documents, including Drawings, General Conditions, and all Sections of Division 01- General Requirements, apply to the Work of this Section.

1.02 - RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine all of the Contract Documents for requirements which affect the Work of this Section.

B. Other Specification Sections which directly relate to the Work of this Section.

1.03 - SCOPE OF WORK

A. Provide all labor, material, equipment, and services specified herein or reasonably necessary for and incidental removal and legal disposal of Asbestos Containing Materials (ACM).

B. The General Contractor shall retain the services of a Massachusetts licensed asbestos abatement contractor to perform all required scope at no additional cost to the owner.

C. The asbestos abatement contractor shall comply with unit prices listed at the end of this section.

1.04 - POTENTIAL ASBESTOS HAZARDS

A. The disturbance or dislocation of ACM may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health hazard to Workers, and building occupants. Apprise all Workers, supervisory personnel, subcontractors, and consultants who will be at the job site of the seriousness of the hazard and of proper Work procedures which shall be followed.

B. Where 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, take appropriate continuous measures 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.

C. If the asbestos abatement contractor failed to comply with the requirements of the specifications, the Owner's Representative (Project Monitor) may present a written stop of Work order. The asbestos abatement contractor shall immediately and automatically stop all Work until authorized in writing by the Project Monitor to commence Work. All costs related to delays shall be at the asbestos abatement contractor’s expense.

1.05 - 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 of time.

C. Asbestos: The name given to a number of 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 one percent or more by weight of asbestos of any type or mixture of types. EPA laws may vary in their definition of ACM.

E. Authorized Visitor: The Owner, the Designer, or a representative of any regulatory or other agency having authority over the project.

F. Designer: Commonwealth of Massachusetts licensed Designer Ammar Dieb, Universal Environmental Consultants (AD-900326).

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 weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

I. Removal: All specified procedures necessary to strip all ACM from the designated areas and to dispose of these materials at an acceptable site.

J. 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.

1.06 – ASBESTOS ABATEMENT 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.

1.07 - 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 per 29CFR 1926 for the asbestos abatement contractor and is the asbestos abatement contractor's representative responsible for compliance with all applicable federal, state, and local regulations. This person shall 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 shall be certified by the Commonwealth of Massachusetts.

B. Asbestos abatement contractor shall provide proof of such certification to the Designer not less than 10 days (Document Submission Date) prior to commencing any Work. The accredited Supervisor shall be at the Work site at all times while Work is in progress.

1.08 - SPECIAL REPORTS

A. Except as otherwise indicated, submit special reports directly to the Project Monitor 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 asbestos abatement contractor's personnel, evaluation of results, and similar pertinent information. When such events are known or predictable in advance, advise the Project Monitor 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 as including events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss.

1.09 - PERMITS AND 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 10 Working days prior to commencement of the Work.

B. No later than the Document Submission Date, notify the local fire and police department, in writing, of proposed asbestos abatement Work. Advice 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 - RESPIRATOR PROGRAM

A. Establish a respirator program per ANSI Z88.2 and 29 CFR 1926.1101 (h), 1926.l03, and 1910.134.

1.11 - 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 abatement 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 abatement contractor is responsible for providing medical examinations and maintaining medical records or personnel per any applicable federal, state, and local regulations. The asbestos abatement contractor shall hold the Owner, Designer and Owner's Representative harmless for failure to comply with any applicable Work, hauling, disposal, safety, health, or other regulation on the part of himself, his employees, or his subcontractors.

1.12 - REFERENCE STANDARDS

A. Unless otherwise indicated, all referenced standards shall be the latest edition available at the time of bidding. Any requirements of these specifications 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 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.

1.13 - SUBMITTALS

A. The asbestos abatement contractor shall email a completed set of submittals to be received by the Designer no later than the Document Submission Date. No Work can commence until all submittals have been approved. The asbestos abatement contractor shall be required to provide updates.

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 shall have satisfactorily completed the NIST Proficiency Analytical Testing (PAT) Program and be licensed by the appropriate state agency. Submit the certification that people counting the samples have been judged proficient by successful completion of the NIOSH 582 course (or equivalent), be listed in the AIHA Asbestos Analysts Registry (AAR) or approved by DLS. 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 machines in the Work area.
5. Location of pressure differential measurement equipment.
6. Manufacturer’s product data on equipment is 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 have 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 license.

1.14 - 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 Owner's on-site representative 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 Owner's Representative with the application for final payment.

D. 15% percent of the Contract will be held until original copies of the Waste Shipment Records are submitted.

1.15 - AIR MONITORING

A. Throughout the entire removal and cleaning operations, air monitoring will be conducted to ensure that the asbestos abatement contractor is complying with the EPA and OSHA regulations and any applicable state and local government regulations. The Owner will provide a Project Monitor (Universal Environmental Consultants) to take air samples at the job site at no cost to the asbestos abatement contractor.

B. The purpose of the Owner's air monitoring will be to detect faults in the Work area isolation such as:

1. Contamination of the building outside of the Work 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 abatement contractor should immediately cease asbestos activities until the fault is corrected! Work shall not commence until authorized by the Designer.

1.16 - AIRBORNE FIBER COUNTS

A. If any air sample taken outside of the work area exceeds the base line established below, 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 space involved (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 areas.
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 abatement contractor's Supervisor and the Project Monitor.

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 Project Monitor 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. Subsequent to 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 in the electron microscopy analysis.

C. If Electron microscopy is used to arrive at the basis for determining "Airborne Fiber" counts 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 abatement contractor, at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 - 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.

2.02 - 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. Cabinets 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. Units 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 I0 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 housing 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 an HEPA filter. Units shall be equipped with automatic shutdown systems 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 should be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet shall be grounded.

2.03 - DANGER SIGNS AND LABELS

A. Provide and display danger signs at each location where airborne concentrations of asbestos fibers may be in excess of 0.010 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. Sign shall meet the requirements of 29CFR 1926.200.

C. A sample of the signs to be used shall be submitted to the Designer for approval prior to beginning Work area preparation.

2.04 - 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. Require all people without exception to pass through this decontamination unit for entry into and exiting from the work area for any purpose. Do not remove equipment or materials through Personnel Decontamination Unit. Provide temporary lighting within decontamination units.

B. Build suitable framing or use existing rooms, with the Project Monitor's 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 must be constructed with tops made of 5/8-inch 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 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 workers may enter the Clean Room directly from the Shower Room. Protect all surfaces of room with sheet plastic. Authorization for this must be obtained from the Project Monitor in writing prior to start of construction.

1. Maintain floor of changing room dry and clean at all times. Do not allow overflowing water from shower to wet floor in Changing Room.
2. Damp wipes 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 one 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 heading 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 showerheads and controls.
4. Provide temporary extensions of existing hot and cold water and drainage, 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 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 areas; 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 cleans all surfaces after each shift change.

2.05 - EQUIPMENT DECONTAMINATION UNITS

A. In areas with only one access, it may be impossible to utilize a separate Equipment Decontaminate Unit. In this case, all equipment and waste materials will exit through the Personnel Decontamination Chambers.

B. When access to the work area is available, provide an Equipment Decontamination Unit consisting of a serial arrangement of rooms, Clean Room, Holding Room, Washroom 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 Washroom as an equipment, bag, and container cleaning station.

D. Provide Washroom for cleaning of bagged or contained asbestos containing waste materials passed from the work area. Construct Washroom 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 six mill polyethylene sheeting, or rigid self-closing doors.

E. Provide Holding Room as a drop location for bagged ACM passed from the Washroom. 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 Washroom 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.

2.06 - PERSONNEL PROTECTION

A. Prior to commencement of work, the workers shall be instructed in, and shall be knowledgeable of, the hazards of asbestos exposure; use and fitting of respirators; protective dress; use of showers; entry and exit from work areas, and all aspects of work procedures and protective measures.

B. It is the responsibility of the asbestos abatement contractor to ensure that all personnel entering the work area wear approved respirator and protective clothing.

C. All asbestos abatement workers shall receive training and shall be accredited per 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.

D. Prior to the start of work, the asbestos abatement contractor shall provide medical examinations for all employees in accordance with 29CFR 1926.1101 (m). All employees hired by the asbestos abatement contractor after start of work shall have medical examinations in accordance with this paragraph before being put to work.

E. Maintain complete and accurate records of employee's medical examinations, during employment, for a period of 30 years after termination of employment and make records of the required medical examinations available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health, 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.

F. Provide personnel exposed to airborne concentrations of asbestos fibers with fire retardant disposable protective whole-body clothing, head covering, gloves, and foot coverings. Provide gloves to protect hands. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape. Asbestos abatement contractors should require and monitor the use of complete protective clothing. A competent person designated by the asbestos abatement 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.

G. Provide goggles to personnel engaged in asbestos operations when the use of a full-face respirator is not required.

H. Provide authorized visitors with suitable protective clothing, headgear, eye protection and footwear, whenever they are required to enter the work area, to a maximum of three changes for three visitors per day. One of the sets of protective clothing must be available for full time use by Project Monitors.

I. Provide all people with personally issued and marked respiratory equipment approved by NIOSH and OSHA. The appropriate respiratory protection will be selected according to the most recent Massachusetts regulations.

J. 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 sufficient filters for replacement for workers per applicable regulation.

K. If the permissible respirators fail to provide sufficient protection against volatile emitted by any sealant used, the services of a qualified Project Monitor will be procured, at the asbestos abatement contractor's expense, to determine proper respiratory protection. The Owner will not be liable for the cost of increased respiratory protection.

L. 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 personnel wearing negative pressure respirators shall have respirator fit tests within the last six months and signed statements shall be available.

PART 3 - EXECUTION

3.01 - SCOPE OF WORK

A. The asbestos abatement project might be performed in phases. It is the asbestos abatement contractor’s responsibility to comply with the phasing schedule.

B. The project monitor(s) will record on a daily basis all quantities removed. The asbestos abatement contractor shall be required to do the same. Both the project monitor and the supervisor shall sign UEC logs daily. At the completion of the total project (no exception), should quantities removed per UEC logs were found to be less than the listed below, the asbestos abatement contractor shall be required to issue a credit to the owner based on unit prices or will be paid at the unit prices should quantities removed were found to be greater than the listed below. Unit prices are listed at the end of this section.

LOCATION	***TYPE OF MATERIAL***	***APPROXIMATE QUANTITY***
Interior	Flooring Materials	32,000 SF
	Hard Joint Insulation	1,000 Total
	Hidden Hard Joint Insulation	1,500 Total
	Debris/Soil in Crawl Space	10,000 SF
	Transite Panels	18 Total
	Windows	70 Total
	Demolition to Access ACM	15,000 SF
	Hardwood Flooring/Paper	4,500 SF
	Lab Counter Tops	14 Total
	Flexible Connecters	16 Total
	Chalkboards/Tackboards	42 Total
Exterior	Lintel Caulking	50 LF
	Old Doors	3 Total
	Expansion Joint Caulking	120 LF
	Transite Sewer Pipes	,500 LF

C. Specific Notes:

1. It is the asbestos abatement contractor's responsibility to inspect the site and confirm condition and quantities prior to the submission of his/her bid package. It is also the asbestos abatement contractor’s responsibility to review the demolition drawings, notes, and phasing configurations. The asbestos abatement contractor shall include in his/her bid the cost to remove all materials listed above.
2. Remove and dispose as ACM of carpets, multiple layers of vinyl floor tiles, resilient baseboard, stair treads, transition strips, leveling compound, wood, ceramic tiles, grout, adhesive, and mastic. Removal shall be done which leaves substrate smoothly (in similar condition to that which existed prior to Mastic application). Use of Chemicals will be permitted. Once visual inspection and clearance air sampling is performed, the asbestos abatement contractor shall shoot blast or hand grind the floor until there is no staining left. The asbestos abatement contractor shall be required to disconnect services (gas, water) and remove and dispose of fixed objects to access ACM. Should ACM be found underneath objects not previously removed, the asbestos abatement contractor shall be required to perform abatement at no additional cost to the owner for re-mobilization. The asbestos abatement contractor may prepare a plan to sand blast the floors for approval by the DEP.
3. Disconnect, remove, and properly dispose of the sinks.
4. In all areas where ACM pipe and hard joint insulation has to be removed, ACM debris is included in the scope of Work and has to be removed and disposed of as ACM at no extra cost to the Owner.
5. Remove and dispose as ACM of all ACM pipe and hard joint insulation including hidden and any ACM debris that might be found. It is the asbestos abatement contractor’s responsibility to uncover and remove all hidden ACM prior to demolition.
6. Remove and properly dispose of interior windows, doors including but not limited to screens, windows, panels, glass, glass blocks, frames, sash, casings, sills, shims, fasteners, anchors, sealant, and flashing. Caulking was found to contain asbestos and assumed to contain greater than 1ppm of PCB’s.
7. Remove and dispose of as ACM of generator exhaust insulation.
8. Remove and dispose as ACM of chalkboards, 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.

9. Disconnect, remove, and properly dispose of light fixtures tubes. It is the asbestos abatement contractor's responsibility to quantify prior to bidding.
10. Remove and dispose of ACM of all ACM hard joint insulation in the tunnels. Remove, decontaminate, and dispose of all stored items regardless of type. Remove a minimum of 3 inches of soil throughout or until there is no visible emission.
11. The asbestos abatement contractor shall make spot demolition of all walls/ceilings to uncover hidden ACM including fireproofing that may be found prior to the demolition activities. The asbestos abatement contractor shall perform needed demolition at no additional cost to the owner to remove all ACM under full containment. Quantity listed above is estimated. It is the asbestos abatement contractor's responsibility to perform demolition to perform the work at no additional cost to the Owner. There will be no add or deduct to this line item.
12. Remove and properly dispose of exterior window wall system, including but not limited to plywood, screens, doors, unit vents, windows, panels, transite panels (multiple layers/paper/glue) glass, glass blocks, frames, sash, casings, sills, shims, fasteners, anchors, sealant, transite panels (multiple layers), and flashing. Wire-brush all adjacent surfaces to insure the complete removal of caulking. Caulking was found to contain asbestos and assumed to contain greater than 1ppm of PCB's.
13. Remove and properly dispose of expansion joint caulking. Caulking was found to contain asbestos and assumed to contain greater than 1ppm of PCB's.
14. Remove and dispose as ACM of transite/insulated, including orange pipe and debris that might be found during excavation/demolition. The Site Contractor shall perform excavation to expose the pipe. The asbestos abatement contractor shall be required to perform additional excavation (if needed) to remove the ACM.

3.02 - JOB CONDITIONS

D. Do not commence asbestos abatement Work until:
   1. Arrangements have been made for disposal of waste at an acceptable site.
   2. Work areas and decontamination enclosure systems and parts of the building required to remain in use are effectively segregated.
   3. Tools, equipment, and material waste receptors are on hand.
   4. All other preparatory steps have been taken, and applicable notices posted and permits obtained.

E. The asbestos abatement contractor is required to set up and test the emergency generator in the presence of the Project Monitor.

F. All materials resulting from demolition Work, except as specified otherwise, shall become the property of the asbestos abatement contractor, and shall be disposed of as specified herein.

3.03 - INSPECTION AND PREPARATION

A. Examine the areas and conditions under which asbestos will be abated and notify the Designer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

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

C. Asbestos abatement activities shall be performed using the glovebag method, mini-containment or full containment depending on each scope of work. Type of enclosure will be determined by the asbestos abatement contractor and the on-site project monitor at no additional cost to the owner.

3.04 - 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. Eating, smoking, or drinking shall not be permitted in the asbestos control area. Removal of lights and other objects in contact with asbestos containing materials is considered as asbestos abatement activities. Thus, individuals involved in such activities shall meet all requirements of federal and state regulations for asbestos abatement workers, including training and medical examinations.

B. Provide and post, in the Equipment Room and the Clean Room, the decontamination and Work procedures to be followed by Workers, as described hereinafter.

C. 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 (including but not limited to coveralls, head covers, boots and other related clothing) shall be removed and properly disposed of before leaving equipment room. Naked, with the exception of their respirators, the workers shall proceed to the shower room. Under the shower, respirators will be removed and cleaned. Cleaned respirators will be placed in suitable clean plastic bags and carried by employees to Clean Room. Soap, towels, and other cleaning supplies shall be furnished by the asbestos abatement contractor. The asbestos abatement contractor shall maintain proper sanitary conditions. The asbestos abatement contractor's designated competent person shall ensure that these practices are being adhered to.

D. 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, footwear contaminated waste.

E. 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.

F. 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.

G. Workers should not eat, drink, smoke, or chew gum or tobacco in asbestos abatement Work areas.

H. 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 including, but not limited to, lights and HVAC grills.

3.05 - 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, sheetrock, 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 seeping or vacuuming with equipment not equipped with HEPA filters will not be permitted. Dispose of all clothes, which are used for cleaning as contaminated waste.

C. 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.

D. 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.

E. Maintain emergency and fire exits from the Work areas or establish alternative exits satisfactory to the local fire officials. Coordinate project with local fire and police departments, and Owner's Representative.

F. 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.

3.06 - 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.

3.07 - CONTROL ACCESS

A. Permit access to the work area only through the Decontamination Unit. All other means of access shall be closed off and sealed and 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 project work area.

C. Where the area adjacent to the work area is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting. Construct barrier with nominal 2 by 4-inch (minimum) wood or metal studs l6 inches on centers, securely anchored to prevent movement, covered with minimum l/4-inch-thick hardboard, l/2-inch gypsum wall board, or l/2-inch plywood.

D. 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 of the work area.

3.08 - 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.

3.09 - 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 l5 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. Wherever possible, the units shall be exhausted to the outside of the building. Whenever it is impossible to duct outside, the HEPA units will be run in tandem.

3.10 - REMOVAL OF ASBESTOS CONTAINING MATERIALS

A. Thoroughly wet ACM to be removed prior to stripping and/or tooling 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 amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal Encapsulant is used apply it in strict accordance with manufacturer's written instructions. Perforate outer covering of any installation which has been painted and/or jacketed in order to allow penetration of amended water or removal Encapsulant, or where necessary, carefully strip away while simultaneously spraying amended water or removal Encapsulant on the installation to minimize dispersal of asbestos fibers into the air.

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 bends 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 pipe insulation to fall to the ground or adjacent surfaces. Wet the insulation material and immediately place in a double 6 mil, minimum thickness, and labeled plastic bag.

F. In certain areas, asbestos pipe insulation will be removed with glovebag (with prior approval by the engineer). Bags shall be "Profo-Bag", Abest-O-SAF/SAC, or approved equal and shall follow at a minimum the following guidelines.

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 tested on smoke.
5. Place necessary tools into pouch located inside glovebag. This will usually include bone saw, utility knife, rags, and 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 glovebag 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 glovebag to pipe itself, where previously covered with plastic or duct tape.
8. Place additional layers of tape along the top of the glovebag 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. 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 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 cloth. This shall be done prior to removing the bag.
18. Place the cleaning tools either into the next glove bag or put them into the glove and pull them 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 glovebag and while running the vacuum sufficiently to collapse the bag, cut the glovebag off.
21. Encapsulate all exposed pipes 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.

3.11 - 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 cleans 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 vacuumed the entire floor.

E. In areas that have dirt floors, remove at least one inch of dirt or until visually clean.

F. 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.

G. 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.

H. 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 waste in storm or sanitary drains. Do not dispose of waste into streams or waterways.

I. Store volatile waste in covered metal containers during Work hours and remove from premises at end of Workday. Prevent accumulation of waste, which creates hazardous conditions. Provide adequate ventilation during use of volatile or noxious substances.

J. If the Project Monitor, 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.

K. 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.

L. Leave the windows, doors, and HVAC vents sealed. Maintain HEPA filtered negative air pressure systems, air filtration and decontamination enclosure systems in service.

M. Following the final visual inspection by the Project Monitor, after the removal of ACM and decontamination of Work areas, and while space enclosures systems remain in place, seal all surfaces from which ACM has 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 Project Monitor to verify that asbestos-containing material has been adequately removed. Apply sealer in accordance with manufacturer's recommendations using airless spray equipment.

N. Clearance air test samples will be taken by Project Monitor 24 hours after the encapsulation. Aggressive air sampling will be conducted using 20-inch rotating fans, leaf blowers, and other devices as selected by the Project Monitor. If the Work area is found visually clean and encapsulated, clearance air samples will be made to determine fiber concentrations. Analysis will be made using Phase Contrast Microscopy.

3.12 - 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 abatement contractor shall notify the Project Monitor that the area is ready for clearance.

B. The Owner will pay for the initial testing required for clearance. Should the initial testing fail, the asbestos abatement contractor shall reimburse the Designer for the cost of all additional testing based on $90.00 per hour for project monitor and $30.00 per PCM.

3.13 - DISPOSAL OF ASBESTOS CONTAINING MATERIAL, AND ASBESTOS CONTAMINATED WASTE

A. As the Work progresses, and 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 29CFR 1926.1101.

C. Seal all asbestos and asbestos contaminated waste material in rigid fiber or metal drums lined with double thickness 6-mil, sealable plastic bags. Label the drums and the plastic bags; transport and dispose of all in accordance with the applicable OSHA and EPA regulations. At the conclusion of the job, place all polyethylene material, tape, cleaning material and clothing in the plastic lined drum. Seal, correctly label, and dispose of asbestos waste material.

D. Transport the sealed drums to the approved waste disposal site. The sealed plastic bags may be removed from the drums and placed into the burial site unless the bags have been broken or damaged. Leave damaged bags in the drums and bury the entire contaminated drum. Uncontaminated drums may be recycled. The sealed bags or drums must be covered on the day of disposal. Asbestos abatement contractor shall obtain trip tickets at the landfill to document disposal of asbestos containing materials. A form must be signed, not initially, by all parties. Copies of all trip tickets shall be submitted to the Designer.

E. If a rental vehicle is used to transport asbestos waste, asbestos abatement 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 Designer 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.

3.14 - DISPOSAL OF NON-CONTAMINATED WASTE

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

3.15 - 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.

3.16 - UNIT PRICES

A. All quantities listed in 3.01 are approximate. It is the asbestos abatement contractor's responsibility to inspect the site and confirm condition and quantities prior to the submission of his/her bid package. It is also the asbestos abatement contractor’s responsibility to review the demolition drawings, notes, and phasing configurations.

B. The asbestos abatement contractor shall include in his/her bid the entire scope of work listed in 3.01. The asbestos abatement contractor shall agree and accept all unit prices listed below. Means and methods of removal will be at the discretion of the asbestos abatement contractor with prior approval by the on-site monitor and designer.

C. Units prices listed below are inclusive of all related costs.

	Addition	Deduction
Flooring	$ 7.00 per SF	$ 6.25 per SF
Pipe Insulation	$ 50.00 per LF	$ 45.00 per LF
Hard Joint Insulation	$ 50.00 each	$ 45.00 each
Transite and ACM Insulated Pipes	$ 120.00 per LF	$ 110.00 per LF
Interior Windows/Doors	$ 150.00 each	$ 130.00 each
Demolition to Access	$ 1.25 per SF	$ 1.00 per SF

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work required under this section shall include, but is not limited to the following:
   1. General demolition of structures, including removal of sub-surface foundations and footings completely, as identified in the drawings, and excluding removal of hazardous materials and toxic substances.
   2. Salvage.
   3. Abandonment and removal of existing utilities and utility structures.

B. Division of Responsibilities for General Demolition:
   1. The Fire Protection, Plumbing, HVAC, and Electrical Trade Contractors shall be responsible for cutting, capping, and making safe of their respective building systems and subsystems to allow for demolition by the Construction Manager and Construction Manager's selected non-Trade Bid subcontractors in areas of general building demolition (i.e. complete removal of buildings, structures, and building wings as scheduled).

C. All demolition work shall be coordinated and phased to comply with the Phasing Plans.

1.02 ABBREVIATIONS AND ACRONYMS

A. NFPA. National Fire Protection Association: www.nfpa.org.

B. OSHA. The Occupational Safety and Health Administration: www.osha.gov.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination and as follows:
   1. Coordinate schedules of operations with Owner prior to starting work.
      a. Schedule demolition and dismantling to cause no interference with the use of the existing buildings.
      b. Cooperate with the Owner to reduce to a minimum all interference with normal use of the building.

B. Preconstruction Meeting required per Section 01 70 00 - Execution and Closeout Requirements.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Submit for record a copy of all necessary permits, certificates, and notices required by local authorities for demolition work and transport and disposal of debris.
   2. Site Plan: Indicate:
      a. Vegetation to be protected.
      b. Areas for temporary construction, storage sheds, and field offices.
      c. Areas for temporary and permanent placement of removed materials.
   3. Demolition Work Plan: Submit demolition plan in accordance with requirements of OSHA and local authorities.
      a. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
      b. Include summary of safety procedures.

c. Indicate maintained number and arrangement of exits in occupied portions of the building per Section 01 50 00 - Temporary Facilities and Controls.
d. Include coordination for shut off, capping, and continuation of utility services.

4. Demolition firm qualifications.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
a. Include documentation of:
1) Building Reuse - Maintain Existing Walls, Floors and Roof: percentage of area of existing building to remain.
2) Construction Waste Management: Percentage of construction waste diverted from landfills; calculated by weight or by volume.

D. Closeout Submittals
1. Submit in accordance with the following sections:
a. 01 70 00 - Execution and Closeout Requirements.
b. 01 78 00 - Closeout Submittals.
2. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.
3. Sustainable Design Closeout Documentation: Submit final LEED-required waste management report detailing all waste generated, including disposal and diversion rates for the project.

1.06 EXISTING UTILITY SERVICES:

A. Arrange and pay for disconnecting, removing, and capping utility services within areas of demolition.
1. Utility company back charges will be paid by Owner.

B. Place markers to indicate locations of disconnected services. Identify service lines and capping locations.

1.07 FIELD CONDITIONS - GENERAL DEMOLITION

A. Occupancy: Structures and parts of structures to be demolished will be vacated and use will be discontinued prior to start of work.

B. Salvaged Materials: Items of salvageable value to the Construction Manager may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
1. Exceptions: See SALVAGE paragraph, in PART 3 of this section, for list of items to be salvaged and turned over to Owner or to be re-installed in new construction or renovation areas.
2. Storage or sale of removed items will not be permitted on site.

C. Utility Services: Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.
1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by AHJ and Owner. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

2. Arrange for disconnecting and sealing utilities serving structures to be demolished, prior to start of demolition work.
3. Shut off and cap water service to building areas to be demolished.

D. Utility Services: See Division 26 for disconnection of electrical services. Do not start demolition work until utility disconnections have been completed and verified in writing.

E. Do not start demolition work until utility disconnections have been completed and verified in writing.

F. Remove and legally dispose of freon and glycol that are contained within building systems and fixed equipment.

G. Remove and legally dispose of oil, propane, and associated tanks.

1.08 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.
1. Minimum of five years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: See Section 31 20 00 - Earthwork.

PART 3 EXECUTION

3.01 DEMOLITION

A. Remove that portion of the existing building as designated on the drawings, additional removals not identified on drawings but necessary to complete the work, and as follows:
1. Within and outside the area of new construction, remove foundation walls and footings in their entirety.

B. Items Left Behind by Owner: Except where indicated in PART 3 SALVAGE paragraph below and , or in Section 02 41 01 - Salvage Schedule as to be salvaged and relocated or returned to Owner, or specifically assigned to others, Construction Manager shall be responsible for disposal of all items left behind by Owner within areas of demolition, including but not limited to furniture, equipment, systems, auxiliary components and accessories, appliances, fixtures, appurtenances, storage, containers and contents, and loose objects of all descriptions.

C. Remove paving and curbs required to accomplish new work.

D. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 20 00 - Earthwork.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with requirements in Section 01 70 00 - Execution and Closeout Requirements.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
1. Obtain required permits.
2. Comply with applicable requirements of NFPA 241.
3. Use of explosives is not permitted.
4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
6. Do not close or obstruct roadways or sidewalks without permits from AHJ.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

E. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal, and see DEBRIS AND WASTE REMOVAL paragraph, below.
   2. Dismantle existing construction and separate materials.
   3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

F. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without obtaining permits from Authority Having Jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least seven days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least three days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site and building daily. Burning of materials from demolished structures is not permitted on site.

B. Remove materials not to be reused on site.
   1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal, including:
      a. Waste Management Plan.
      b. Landfill Alternatives Proposal.
      c. Recycling requirements.
      d. Waste disposal reports.
      e. Records of donations.
      f. Records of sales.

C. Transport materials removed from demolished structures and legally dispose off-site.

D. Leave site in clean condition, ready for subsequent work.

E. Clean up spillage and wind-blown debris from public and private lands.

3.05 PROTECTION OF EXISTING BUILDING

A. Use all means and precautions necessary to ensure the safety of the occupants of the building and the good condition of materials, contents, finishes, and systems scheduled to remain.
   1. Construction Manager shall maintain the required exits, where indicated or required for code compliance, from all occupied portions of the building.
   2. See Section 01 51 00 - Temporary Utilities for requirements for temporary exits.

3.06 SALVAGE

A. Salvage items listed below or indicated on drawings. Consult with Owner for items not listed nor indicated on drawings. Take precautions to ensure that salvaged items are not damaged. For items to be re-used, care and effort shall be taken to preserve mounting and other hardware.

B. Where practicable, salvage sufficient quantities of cut or removed material to replace damaged components of existing construction, when material is not readily obtainable on current market.
C. The Construction Manager may reuse for temporary facilities: existing items to be removed, such as doors, frames, hardware, and other items not damaged by demolition, provided such items meet the code requirements and other specified or indicated requirements for such temporary facilities, and provided such items are approved in writing for such use by the Architect.

END OF SECTION

SECTION 02 41 01
SALVAGE SCHEDULE

Salvage List for Wilmington Wildwood Elementary School												
Key #	Product name	Description	Size	QTY	Outside/ inside	Significance: Historical / Memorial	Existing Room Location	Ownership of Salvaging	Storage location during construction	New Room Location	Comments	Image
NORTH INTERMEDIATE SCHOOL												
List Provided by Amy Iascone (Principal of North)												
NIS-1	Blue Bench	It is a blue bench next to the play ground		1	Outside	Historical			TBD	TBD		
NIS-2	laminator			1	inside		As of 1/21/26 it is located in room 101		TBD	TBD		
NIS-3	TV in lobby			1	inside		Lobby		TBD	TBD		
NIS-4	Frank Lentine monument	stone moument with plaque and sign		1	outside	memorial	west of existing school building		TBD	TBD		
NIS-5	Playground Plaque	stone moument with plaque		1	outside	dedication	at playground		TBD	TBD		
NIS-6	Newer Granite curb	Verticle Granite curbing		see diagram	outside	newer	see diagram	Fontaine	TBD	TBD		
NIS-7												

WOBURN STREET SCHOOL

List Provided by Stacey Scott (Principal of Woburn Street School)

Key #	Product name	Description	Size	QTY	Outside/ inside	Significance: Historical / Memorial	Existing Room Location	Ownership of Salvaging	Storage location during construction	New Room Location	Comments	Image
WSS-1	Buddy Bench	Donated by WEF		1	Outside		Playground					
WSS-2	Laminator			2	Inside		Staff Work Room & Storage					
WSS-3												
WSS-4												
WSS-5												
WSS-6												
WSS-7												
WSS-8												

WILDWOOD EARLY CHILDHOOD CENTER

List Provided by Kate Bissell (Principal of Wildwood)

Key #	Product name	Description	Size	QTY	Outside/ inside	Significance: Historical / Memorial	Existing Room Location	Ownership of Salvaging	Storage location during construction	New Room Location	Comments	Image
WW-1	Communication Board	outdoor board with visuals for communication purposes		1	outside		WW playground @ MS		still at WW@MS	ECC playground?	donation from Flutie Foundation	
WW-2	Laminator	large-sized laminator for school items		1	inside		WW@MS library		remains in place	1st floor teacher collab?	fairly new, purchased FY24	
WW-3	Die cut machines	"old-school" manual machines for making shapes from construction		2	inside		WW@MS library WW@West copy room		remain in place	1st floor teacher collab? one in PK wing & one in K wing?		
WW-4												
WW-5												
WW-6												
WW-7												
WW-8												

END OF SECTION

SECTION 02 41 13
UTILITY LINE REMOVAL

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. The work under this Section shall consist of existing underground drainage pipes and utility lines, including associated items of work, as shown on the Plans, and as specified herein.

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

1. Section 31 00 00 - Earth Moving

1.02 RELATED DOCUMENTS

A. The Construction Manager, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the documents identified in Division 00 Procurement and Contracting Requirements and Division 01 General Requirements.

1.03 SUBMITTALS (Not Used)

1.04 QUALITY ASSURANCE

A. The Construction Manager shall perform Work in accordance with The Commonwealth of Massachusetts and the Town of Wilmington rules, regulations, laws and ordinances, and any other authorities having jurisdiction.

1.05 PERMITS, CODES AND SAFETY REQUIREMENTS

A. Work shall conform to the Contract Drawings and Specifications and shall comply with applicable codes and regulations. Present in writing to the Architect, all conflicts between the Contract Drawings, Specifications, and applicable codes and regulations, for resolution before commencing the Work.

B. Comply with all rules, regulations, laws and ordinances of the Town of Wilmington and the Commonwealth of Massachusetts, and of all other authorities having jurisdiction. All labor, materials, equipment, and services necessary to make the work comply with such requirements shall be provided without additional cost to the Town of Wilmington.

C. The Construction Manager shall not close any street, sidewalk, or passageway except as indicated on the Contract Drawings. The Construction Manager shall so conduct his operations as to interfere as little as possible with the use ordinarily made of roads, driveways, sidewalks, or other facilities near enough to the work to be affected thereby.

D. The Construction Manager shall procure and pay for all permits and licenses required for the complete work specified herein and shown on the Contract Drawings at no additional cost to the Town of Wilmington. Arrange and pay for legal off-site disposal of all excess excavated materials, obtain proper disposal receipts from the applicable disposal facility for verification.

E. Notify "Dig Safe" and the Town of Wilmington before starting work; comply fully with utility company requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 DEMOLITION

A. The known existing drainage and utility pipelines are shown on the drawings in their approximate locations. Drainage and utility pipelines include but are not limited to reinforced concrete pipe (RCP), PVC, HDPE, ductile iron, cast iron, CMP, and clay.

B. Locate drainage pipes and utility lines to be removed.

C. Field verify, if required, the depth of the drainage pipes and utility lines to be removed.

D. Any active pipeline lines encountered by the Construction Manager during the construction activities shall be isolated by a method accepted by the Engineer.

E. Excavate and remove the drainage pipes and utility lines at the locations shown on the plans or as directed by the Engineer. Sawcut the pipe and lateral connections, prior to removal, if the

pipe is not removed at the joint.

F. Cap all pipe openings in accordance with the Town of Wilmington standards.

G. All excavated materials shall be removed and disposed of off the Town of Wilmington property unless otherwise noted on the plans.

3.02 BACKFILL

A. Backfill is not included in this section and shall be performed by the plans and requirements of Section 31 00 00 – Earth Moving.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work in this Section includes the cast-in-place concrete work as shown on the Contract Drawings and specified herein, including, but not limited to, the following:
   1. Furnishing, placing, finishing, curing and protection of all plain and reinforced concrete (normal weight and light weight), above and below grade, for buildings and site-related cast-in-place concrete.
   2. Furnishing and erection of formwork, and removal of same.
   3. Furnishing and placing of reinforcing steel, including dowels into masonry walls, welding to structural steel and related positioning and securing of all embedded accessories.
   4. Furnishing and installation of admixtures, concrete surface conditioners, wedge inserts, masonry and dovetail anchors, flashing reglets and similar items in conjunction with concrete work.
   5. Furnishing and installation of approved non-shrink cement grout under base and leveling plates.
   6. Furnishing and installation of vapor barriers/retarders under slabs cast on grade.
   7. Furnishing and installation of insulation under slabs cast on grade per the requirements in Section 07 21 00 – THERMAL INSULATION.
   8. Furnishing and installation of pea-stone concrete fill at depressed slab areas and metal pan stairs and landings as indicated in the drawings.
   9. Installation of items furnished by other Sections such as anchors, bolts, plates and embedded items required to be cast into concrete.
   10. Make provisions in forms for proper location and installation of pipe sleeves, duct openings, keys, chases and electric boxes, as required by other trades.
   11. Accessories for a complete installation.

B. Intent of Work
   1. Except as specified otherwise herein, concrete shall be batched, mixed, placed, tested and cured in accordance with the American Concrete Institute's "Specifications for Structural Concrete for Buildings" ACI 301.
   2. Subcontractor shall schedule his Work and notify all trades in ample time so that provisions for their Work can be made without delaying the progress of the Project.
   3. It is the intention of the Drawings and Specifications to produce concrete which will present an acceptable finished appearance. Imperfections of material or Workmanship shall be corrected per the Engineer's direction, at no additional cost to the Owner.
   4. All of the Work that is to be inserted in the forms for attachment of other work is not described in detail. Sub-Contractor shall carefully examine all drawings and other Sections of these specifications for the extent and detail of all such work and coordinate this work with other trades.
   5. The General Contractor shall be responsible to insure that all concrete surfaces are completely free of any conditions which will adversely affect its finished appearance or the application of a specified finish.
   6. Failure to comply with these requirements will require removal of sufficiently large Section of the Work, as determined by the Architect and Engineer, in order to properly integrate the Section to be replaced with the architectural and structural requirements of the total project.

All such removal and replacement shall be made at the expense of the Subcontract at no additional cost to the Owner.

7. Sustainable Design Intent: 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 Division 01 Section "LEED v4 BD+C REQUIREMENTS" for certification level and certification requirements.
8. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to the Owner's LEED v4 BD+C certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
9. Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.02 RELATED REQUIREMENTS

A. The Conditions of the Contract and General Requirements of the Project Manual apply to this subcontractor, material suppliers and all other persons furnishing labor and materials under this Section. The General Conditions, General Contractor's Supplementary Conditions, and applicable parts of Division 01 are included as part of this Section.

B. Carefully examine all of the Contract Documents for requirements which affect the Work of this Section.

C. Work described in other Sections which contain requirements applicable to the work of this Section, or with which this subcontractor must coordinate the Work of this Section include, but are not limited to the following:

1. Section 00 31 01 – GEOTECHNICAL REPORT
2. Section 01 45 23 – TESTING AND INSPECTING SERVICES.
3. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
4. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
5. Section 04 20 00 – UNIT MASONRY: reinforcing placement for CMU partitions.
6. Section 05 12 00 – STRUCTURAL STEEL FRAMING
7. Section 05 15 00 – STUD SHEAR CONNECTORS
8. Section 05 21 00 – STEEL JOIST FRAMING
9. Section 05 31 00 – STEEL DECKING
10. Section 05 50 00 – METAL FABRICATIONS: for trench frames and covers, cast stair nosings and other items for embedment in concrete.
11. Section 05 51 00 – METAL STAIRS
12. Section 07 21 00 – THERMAL INSULATION: requirements for insulation furnished and installed by this Section under concrete slabs on grade.
13. Section 09 30 00 - TILING
14. Section 09 65 00 – RESILIENT FLOORING
15. Section 09 65 66 – RESILIENT ATHLETIC FLOORING
16. Section 11 40 00 – FOODSERVICE EQUIPMENT – coordination of depressed slabs for foodservice equipment.
17. Section 11 66 23 – GYMNASIUM EQUIPMENT – coordination of sleeves to be cast in to concrete slabs for equipment posts.
18. Section 12 48 13 – ENTRANCE FLOOR MATS AND FRAMES – coordination of recesses required for entry mat / grate recesses.
19. Section 14 24 00 – HYDRAULIC ELEVATORS – coordination of pit depth and sump requirements.

20. Section 21 00 10 – FIRE PROTECTION – coordination of housekeeping curbs required and sleeve penetrations of concrete slabs.
21. Section 22 00 10 – PLUMBING– coordination of housekeeping curbs required and sleeve penetrations of concrete slabs.
22. Section 23 00 10 – HEATING, VENTILATING AND CONDITIONING (HVAC) – coordination of housekeeping curbs required and sleeve and duct penetrations of concrete slabs.
23. Section 26 00 10 – ELECTRICAL – coordination of housekeeping curbs required and sleeve penetrations of concrete slabs.
24. Section 31 20 00 - EARTH MOVING
25. Section 31 20 13 - RAMMED AGGREGATE PIER SOIL REINFORCEMENT
26. Section 32 13 16 – CONCRETE PAVEMENT
27. Section 32 31 00 - CHAIN LINK FENCES AND GATES: Site features requiring cast-in-place concrete footings

1.03 REFERENCE STANDARDS

A. Except as modified by the requirements specified herein and/or the details on the Drawings, all Work included in this Section shall conform to the applicable provisions of the following codes, standards and references as well as those specified in Section 01 41 00 – REGULATORY REQUIREMENTS and in the latest edition of the Massachusetts State Building Code (MSBC):

1. ASTM International; www.astm.org
   a. A1064/A1064M-24 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
   b. A615/A615M-12 – Standard Specification for Deformed and Plain Billet-steel Bars for Concrete Reinforcement
   c. A706/A706M-06a – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
   d. C33-13 – Standard Specifications for Concrete Aggregates
   e. C94/C94M-13 – Standard Specification for Ready Mix Concrete
   f. C150-12 – Standard Specification for Portland Cement
   g. C171-20 – Standard Specification for Sheet Materials for Curing Concrete
   h. C260-10a (2016) – Standard Specification for Air-entraining Admixtures for Concrete
   i. C309-19 – Standard Specification for Liquid Membrane-forming Compounds for Curing Concrete
   j. C330-09 – Lightweight Aggregates for Structural Concrete
   k. C494/C494M-19e1 – Standard Specification for Chemical Admixtures for Concrete
   l. C618-23e1 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
   m. C685/C685M-17 – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
   n. C989/C989M-24 – Standard Specification for Slag Cement for Use in Concrete and Mortars
2. ACI. American Concrete Institute; www.concrete.org
   a. ACI 117-10 (Reapproved 2015) – Specifications for Tolerances of Concrete Construction and Materials
   b. ACI 121R-08 – Quality Management System for Concrete Construction
   c. ACI 207.1R-05 – Mass Concrete
   d. ACI 211.5R-14 – Guide for Submittal of Concrete Proportions
   e. ACI 212.3R-16 – Chemical Admixtures for Concrete

f. ACI 213R-14 – Guide for Structural Lightweight Aggregate Concrete
g. ACI 224R-01 – Control of Cracking in Concrete Structures
h. ACI 224.3R-95 (Reapproved 2013) – Joints in Concrete Construction
i. ACI 233R-17 – Slag Cement in Concrete and Mortar
j. ACI 301-20 – Specifications for Structural Concrete for Buildings
k. ACI 302.1R-15 – Guide for Concrete Floor and Slab Construction
l. ACI 302.2R-06 – Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
m. ACI 303.1-97 – Standard Specification for Cast-In-Place Architectural Concrete
n. ACI 304R-00 – Guide for Measuring, Mixing, Transporting and Placing Concrete
o. ACI 304.2R-17 – Placing Concrete by Pumping Methods
p. ACI 305R-20 – Hot Weather Concreting
q. ACI 306R-16 – Cold Weather Concreting
r. ACI 308R-16 – Standard Practice for Curing Concrete
s. ACI 309R-05 – Guide for Consolidation of Concrete
t. ACI 315R-18 – Guide to Presenting Reinforcing Steel Design Details
u. ACI 318-14 – Building Code Requirements for Structural Concrete
v. ACI 336.3R-14 – Design and Construction of Drilled Piers
w. ACI 347-14 – Guide to Formwork for Concrete
x. ACI 351.1R-12 – Grouting between Foundations and Bases for Support of Equipment and Machinery
y. ACI 355.2-07 – Evaluating the Performance of Post-Installed Mechanical Anchors in Concrete
z. ACI 503.4-92 (Reapproved 2003) – Standard Specification for Repairing Concrete with Epoxy Mortars
aa. ACI 544.3R-08 – Guide for Specifying, Proportioning, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete
bb. ACI 546R-14 – Concrete Repair Guide
cc. MNL-66(20) – ACI Detailing Manual

B. ANSI – American National Standards Institute
   1. ANSI/ASCE 9-91 – Standard Practice for the Construction and Inspection of Composite Slabs
C. AWS – American Welding Society
   1. AWS D1.1-20 – Structural Welding Code-Steel
   2. AWS D1.4-11 – Structural Welding Code-Reinforcing Steel
D. CRSI (MSP) – Manual of Standard Practice (28th edition)
E. MSBC – The latest currently enforced edition of the Massachusetts State Building Code
F. IBC – International Building Code, 2021, as amended by the MSBC.
G. ADA – Americans with Disabilities Act 2010.
H. MAAB – Massachusetts Architectural Access Board.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 30 00 – ADMINISTRATIVE REQUIREMENTS, and as follows:
   1. Coordinate concrete testing with Independent Testing Agency.
   2. Coordinate concrete inserts with all trades providing them to this subcontractor for installation.

B. Pre-installation Meetings required per Section 01 30 00 – ADMINISTRATIVE REQUIREMENTS for foundations and slabs, and as follows: Installer of the Work of this Section is also required to attend pre-installation conference specified under Section 04 20 00 – UNIT MASONRY.

1.05 SUBMITTALS

A. Refer to Section 01 30 00 – ADMINISTRATIVE REQUIREMENTS for submittal provisions and procedures.

B. General

1. Review of submittals is for general conformance with the design concept of the project and information shown on the contract documents only. The General Contractor is responsible for conforming, correlating and coordinating dimensions in the field for tolerance, clearances, quantities, fabrication and installation processes, means and methods of construction, coordination of this work with other trades and performing work in a safe and satisfactory manner.
2. Prior to final approval of Shop Drawings for exposed architectural concrete surfaces the Mock-up specified herein shall be completed and approved. Any modifications of the Mock-up formwork shall be incorporated into the Shop Drawings and other submittals.

C. Shop Drawings: Comply with ACI 315 for reinforcement detailing, fabricating, bending and placing concrete reinforcement. Show 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 wall elevations with a scale of one-quarter inch per foot.
2. Include special reinforcing required for openings through concrete structures including but not limited to duct banks, conduits, waste water pipes, rain leaders.
3. Submit shop drawings of all formwork for architecturally exposed concrete (Concrete Exposed to View) showing cone tie patterns.
4. Submit Drawings of formwork design for review of form types, location of joints and ties, details of reveals, chamfers, textured surfaces and other visual aspects of concrete.
5. Submit detailed drawings showing locations of all concrete joints (construction, contraction and expansion), curbs, depressions, sleeves and openings.
6. Submit plans and other details showing sequence of concrete pours. This will be reviewed only for impact on the performance of the completed structure.
7. Submit detail drawings indicating position of waterstops and details to be used for all water tight construction.
8. Submit shop drawings detailing Mock-up if a Mock-up has been specified.
9. Submit shop drawings that include wall elevations, section details and dimensions for all walls, footings and any other concrete element.
10. Submit shop drawings that include saw-cut patterns on slab-on-grade and joint details at columns.

D. Concrete Curing and Protection:

1. Submit detailed methods proposed for use for curing and protection prior to commencement of concrete work, including
   a. Cold and Hot Weather protection plan
   b. Curing protection plan for footings, walls, slabs-on-grade, slabs-on-deck, beams, columns.

E. Concrete Mix Design: Submit proposed mix designs for each class of concrete indicated in section 2.02. Include the following:

1. Copies of mix designs: Mix designs shall be prepared by an independent testing laboratory.
2. The mix design submittal shall list:

a. All materials, admixtures and their proportions.
b. Water and cement content, water cementitious material ratio, slump and combined aggregate gradation (percent retained on every sieve size).
c. Compressive Strength: Documentation of how the strength was determined.
d. Information on concrete materials as per paragraph 4.1.2.3 of ACI 301.
e. Whether mix is appropriate for pumping.
f. Indicate where each mix will be used.
g. This submittal shall include the results of all testing performed to qualify the materials and to establish the mix design. Include all calculations and tests required by ACI 318 Section 5.3.
h. Test results of total chloride in content.
i. Where shrinkage limit is specified, submit shrinkage test results.
j. For lightweight aggregate used, submit test results per ASTM C330-03.
k. For normal weight aggregate, submit test results per ASTM C33-05.

F. Product Data:
1. Submit product data for proprietary materials, the following products and those requested by the Architect and/or SER showing compliance with project specifications, manufacturer's recommendations, as well as known limitations. Provide certification that the following materials conform to the standards referenced in this section including, but not limited to:
2. Reinforcement
3. Form work and accessories
4. Admixtures
5. Cementitious materials used in mix design
6. Patching compounds
7. Water-stops
8. Joint systems
9. Curing materials
10. Dry-shake finish materials
11. Non-shrink grout

G. Certifications: Submit certification by the manufacturers that each admixture conforms to requirements specified in this section and that the admixtures are compatible with one another.

H. Submit cement mill tests.

I. Upon completion of the concrete Work, submit records of concrete placement and the concrete batch tickets to the Architect and/or SER.

J. Warranty:
1. 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.

K. Samples:
1. Submit samples and/or descriptive literature of materials, products and methods as noted herein and as otherwise requested by the architect and/or the SER.
2. Prepare a four foot by four foot by six inches thick sample on the site for the polished concrete flatwork using the approved concrete mix design, admixtures, sealers and joint sealers, a minimum of one month prior to casting the slabs, for approval by the Architect.
3. Submit three representative samples of each concrete constituent including, but not limited to:
a. Admixtures and topical treatments

b. Form ties (including cones) and spreaders
c. Accessories for reinforcement
d. Reglets
e. Form release agent
f. Pre-molded joint filler
g. Dovetail anchors
h. Vapor retarder
i. Under-slab rigid insulation board
j. Non-shrink cement grout
k. Threaded, Wedge, and Slotted inserts
l. Bulkhead or control joint breakaways
m. Control joint pull out reglets

1.06 LEED SUBMITTALS

1. This subcontractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator for submission to LEED-Online: https://leedonline.usgbc.org. Refer to Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS for all requirements; and Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.07 QUALITY ASSURANCE

A. Qualification of Workmen:
   1. Provide one or more persons who shall be present at all times during the execution of this portion of the Work and who shall be thoroughly trained and experienced in the types of concrete specified and who shall direct all work performed under this Section.
   2. The individual directing this work shall have at least five years of foreman experience with ‘As-cast’ Architectural concrete.
   3. For finishing of exposed surfaces of the exposed concrete, use only thoroughly trained and experienced journeymen concrete finishers.
   4. Product(s) Technical Representative: Provide services of a qualified technical representative approved by reinforcement manufacturer to instruct concrete supplier in proper batching and mixing procedures.

B. Mock-ups per SECTION 01 40 00 – QUALITY REQUIREMENTS, and as follows: Architectural Concrete exposed-to-view
   1. Provide full scale three-dimensional assemblies utilizing final specified materials and final production techniques, constructed to be fully tested to ensure that the systems meet the performance requirements of the Specification by application of the maximum applied loads, in-situ conditions and structural movements.
   2. Build Mock-up in location and size acceptable to Architect of type specified.
   3. Notify design professional seven days in advance of time when mock-up will be installed for approval viewing.
   4. Demonstrate the anticipated range of materials, workmanship and finish expected.
   5. Obtain approval in writing before commencing work. Mock-up may not be included as a part of the finished project.
   6. Protect the approved mock-up during construction period as it will be used to comparatively judge the finished installation

1.08 DELIVERY, STORAGE, AND HANDLING

A. Comply with ACI, concrete plant’s instructions and recommendations, Section 01 60 00 – PRODUCT REQUIREMENTS, and as follows:

1. Handle and store materials separately in such manner as to prevent intrusion of foreign matter, segregation, or deterioration.
2. Do not use frozen materials or those containing ice.
3. Store bags of concrete or grout indoors.
4. Remove improper and rejected materials immediately from point of use.
5. Cover materials, including steel reinforcement and accessories, during construction period.
6. Stockpile concrete constituents properly to assure uniformity throughout project.

PART 2 PRODUCTS

2.01 CONCRETE CONSTITUENTS

A. Cement: Shall be American-made Portland Cement; and conform to chemical and physical requirements of ASTM C150 for Type I for exposed concrete and Type II, low alkali, standard gray color for all other work.
   1. 25 percent replacement of cementitious materials with fly ash or slag is to be used to comply with the sustainable design requirements, except for all slabs.
   2. Fly ash or slag used in interior concrete slab-on-grade or elevated slab construction shall be 15 percent replacement of cement.
   3. High early strength cement conforming to ASTM C150 Type III may only be used with permission of the SER given in writing.
   4. Do not use air-entraining cements.

B. Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C33.

C. Normal Weight Coarse Aggregate: Shall be well-graded crushed stone or washed gravel conforming to ASTM C33.

D. Light Weight Fine and Coarse Aggregate: Shall conform to ASTM C330.

E. Water: Shall be from approved source, potable, clean and free from oils, acids, alkali, organic matter and other deleterious material.

F. Admixtures:
   1. Normal Range Water-reducing Agent: ASTM C494, Type A. Water-reducing agent shall be by same manufacturer as air-entraining agent.
      a. Acceptable Products and Manufacturers:
         1) "Eucon WR-91" by Euclid Chemical Company
         2) "ZYLA610" by W. R. Grace & Co.
         3) “Pozzolith” Series by BASF Corporation
         4) Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.
   2. Mid-Range Water Reducing Agent: ASTM C494, Type A Water-reducing agent shall be by same manufacturer as air-entraining agent.
      a. Acceptable Products and Manufacturers:
         1) “Eucon MR” by Euclid Chemical Co.
         2) "MIRA62" by W.R. Grace & Co.
         3) "PolyHeed" Series by BASF Corporation
         4) Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.
   3. High Range Water Reducing Agent / Retarder: ASTM C494, Type F or Type G Water-reducing agent shall be by same manufacturer as air-entraining agent.
      a. Acceptable Products and Manufacturers:
         1) "Eucon-37 (F)" or "Eucon-537 (G)" by Euclid Chemical Co.
         2) "WRDA (F)" or "Daracem-100" by W.R. Grace & Co.
         3) "Glenium” Series or “Rheobuild 1000” by BASF Corporation

4) Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.

4. Air-entraining agent: ASTM C260. In no instance shall air percent content exceed five percent by volume.
   a. Acceptable Products and Manufacturers:
      1) "Eucon Air Mix" by Euclid Chemical Co.
      2) "Darex AEA" by W. R. Grace & Co.
      3) “Micro Air” by BASF Corporation
      4) Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.

2.02 CONCRETE MIXTURES

A. Footings and Foundation Walls: Proportion structural normal weight concrete mixture as follows:
   1. Minimum Compressive Strength: 4500 PSI at 28 days.
   2. Maximum water – cementitious material ratio: 0.45.
   3. Slump Limit: four inches, plus or minus two inches.
   4. Air Content: six percent, plus or minus 1 1/2 percent at point of delivery for 3/4 inches nominal maximum aggregate size.

B. Site Concrete including Walls and Site Retaining Walls (all concrete exposed to weather): Proportion structural normal weight concrete mixture as follows:
   1. Minimum Compressive Strength: 5000 PSI at 28 days.
   2. Maximum water – cementitious material ratio: 0.40.
   3. Slump Limit: four inches, plus or minus one inch.
   4. Air Content: six percent, plus or minus 1 1/2 percent at point of delivery for 3/4 inch nominal maximum aggregate size.

C. Slabs-on-Grade: Proportion structural normal weight concrete mixture as follows:
   1. Minimum Compressive Strength: 4500 PSI at 28 days.
   2. Maximum water – cementitious material ratio: 0.45.
   3. Slump limit: four inches, plus or minus one inch.
   4. Air Content: five percent, plus or minus 1 1/2 percent at point of delivery for 3/4 inch nominal maximum aggregate size. Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Slabs on Steel Deck: Proportion structural normal weight and light weight concrete mixture as follows:
   1. Minimum Compressive Strength: 4500 PSI at 28 days.
   2. Maximum water – cementitious material ratio: 0.45.
   3. Slump Limit: four inches, plus or minus two inches
   4. Air Content: five percent, plus or minus 1 1/2 percent at point of delivery for 3/4 inch nominal maximum aggregate size.

E. Exterior Paving Concrete: Proportion structural normal weight concrete mixture as follows:
   1. Minimum Compressive Strength: 5000 PSI at 28 days.
   2. Maximum water – cementitious material ratio: 0.40.
   3. Slump Limit: four inches, plus or minus two inches.
   4. Air Content: minimum six percent, plus or minus 1 1/2 percent at point of delivery for 3/4 inch nominal maximum aggregate size.

F. Concrete Fill in Metal Pan Stairs: Proportion structural normal weight concrete mixture with 3/8 inch aggregate as follows:
   1. Minimum Compressive Strength: 4,500 PSI at 28 days.
   2. Maximum Water – cementitious material ratio: 0.45.

3. Slump limit: four inches, plus or minus two inches.
4. Air Content: six percent, plus or minus 1 1/2 percent at point of delivery.

G. Water reducing and air-entraining agents shall be used in all concrete. Total entrapped air plus entrained air in freshly mixed concrete shall be four percent (Plus or minus one percent) of volume of concrete with required strengths maintained.
1. Use a high range water reducing agent for all concrete for slabs-on-grade and slabs-on-metal deck.
2. Use a mid-range water reducing agent in all pumped concrete with a water/cement ratio greater than 0.40.
3. Use a high range water reducing agent in concrete with a water cement ratio of 0.40 or less.

H. Calculated Equilibrium Unit Weight of dry normal weight concrete shall be 147 pcf, plus or minus three pcf. as determined by ASTM C 567.

I. Calculated Equilibrium Unit Weight of all dry light weight concrete shall be 113 pcf, plus or minus three pcf. as determined by ASTM C 567.

J. In lieu of preparing mix design in laboratory, a production mix may be proposed provided a record of at least 30 consecutive strength tests is submitted to the Architect and SER for review. Tests shall be from similar mix used in last 12 months and average compressive strength shall be consistent with standard deviation of compressive strengths permitted in ACI 318, Chapter 4, paragraph 4.3, "Proportioning on the basis of field experience".

K. Any deviation from approved mix design, which the General Contractor deems desirable under certain project conditions, will not be allowed without examination and written review by the SER.
1. Costs of additional testing by the SER and/or the Testing Agency shall be paid for by the General Contractor, at no additional cost to the Owner.

2.03 FORM MATERIALS

A. Exposed Concrete Surfaces: Shall conform to ACI-301, Chapter 6 – “Architectural Concrete.

B. Forms for concrete surfaces exposed to view in finished work shall be new Class I High Density Overlay Plyform, exterior grade, not less than five ply nor less than 5/8 inch thick conforming to U.S. Product Standard P-1-66.
1. All form joints shall be sealed with approved non-staining sealant to be watertight.

C. Concrete Surfaces Not Exposed to View: Forms for concrete surfaces not exposed to view in finished work shall be made of wood, metal or other materials subject to review of the Architect and the SER, and shall conform to ACI 301, Chapters Four and Ten.

D. Form Ties and Spreaders: Ties for walls in areas exposed to view in finish work.
1. Basis-of-Design Product and Manufacturer: Type SPCH - Stainless Steel "Snap-Ties" by Richmond Screw Anchor Co., or a SER acceptable equivalent subject to compliance with requirements from one of the following manufacturers:
2. Superior Concrete Accessories, Inc.
3. Dayton Sure-Grip and Shore Co.
4. Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.
5. Wire ties shall not be used.
6. Where concrete is to be left exposed, painted or plastered, ties shall have removable tapered, plastic cones one inch outside diameter.
7. Ties for walls below grade and in areas not exposed to view in finished work shall be snap ties with removable cones, and shall incorporate water seal washer.

E. Form Release Agent: Shall be of a non-staining and non-emulsifiable type, or equal approved by the SER. Form release agent shall not impart any stain to concrete nor interference with adherence of any finish material to be applied to any concrete surface.

2.04 REINFORCEMENT AND ACCESSORIES

A. Recycled Content of Steel: Use maximum available percentage of recycled steel. Reinforcing steel incorporated into the work shall contain not less than 95 percent of recycled scrap steel.

B. Reinforcing Steel Bars: Shall be newly rolled billet steel conforming to ASTM A 615 (Grade 60 unless noted). Bars shall be bent cold as required. Reinforcing bars being welded shall conform to ASTM A 706, Grade 60.

C. Welded Wire Reinforcement ASTM A 1064: All welded wire reinforcement shall be supplied in sheets and is to be used in slabs on grade and on deck as noted. No fiber mesh substitutes will be permitted.

D. Reinforcement Accessories: Shall conform to Product Standard PS7-766, National Bureau of Standards, Department of Commerce, Class C. Reinforcement accessories shall include spacers, chairs, ties, slab bolsters, slips, chair bars, and other devices for reinforcement.

1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
2. Hohmann & Bernard, Inc.
3. Superior Concrete Accessories, Inc.
4. Dayton Sure-Grip and Shore Co.
5. R.K.L. Building Specialties Co., Inc.
6. Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.
7. 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.

2.05 MISCELLANEOUS MATERIALS

A. Under-slab Vapor Retarder:

1. Non-woven plastic geo-membrane sheet product meeting or exceeding the requirements of an ASTM E-1745 vapor retarder.
2. Performance Requirements:
3. Permeance of less than 0.01 Perms [grains / (ft2 – hr – inHg)] as tested in accordance with ASTM E 1745 Section 7.
4. Other performance criteria:
5. Strength: Meet ASTM E 1745 Class A requirements.
6. Tensile Strength: 45 pound-feet / in per ASTM D-882 or E-154
7. Puncture Resistance: 2200 grams per ASTM D-1709
8. Thickness: 15 mils. Minimum
9. Manufacturer:
   a. Basis of Design: Stego Wrap Vapor Barrier (20 –mil.) by Stego Industries LLC, (877) 464-7834; www.stegoindustries.com.
10. Other acceptable products:
    a. Perminator (15 mil) by W. R. Meadows, Inc. (800) 342-5976; www.wrmeadows.com.
    b. Barrier-Bac VB-350 (16 mil) by Inteplast Group, (877)535-0555, www.BarrierBac.com.
    c. Vapor Block (15 mil) manufactured by Raven Industries, (800) 635-3456; www.ravenind.com.
    d. Griffolyn (15 mil) manufactured by Reef Industries, (800) 231-6074; www.reefindustries.com.
    e. Viper II (15 mil) manufactured by Insulation Solutions, Inc. www.insulationsolutions.com.

1) Other manufacturer's products accepted by the Awarding Authority as equal to the specified products. Submit as substitutions: See Section 01 25 00 – SUBSTITUTION PROCEDURES.

11. Accessories:
12. Seam tape, mastic, piping boots, termination strips and other accessory items per manufacturer requirements.

B. Curing Mediums:
   1. Absorptive Cover: Burlap cloth made from jute or Kenaf, weighing approximately nine ounces per square yard complying with AASHTO M182, Class 2.
   2. Moisture Retaining Cover: One of the following complying with ASTM C171:
   3. Waterproof paper,
   4. Polyethylene film,
   5. Polyethylene-coated burlap.

C. Floor Hardener: Hardener to be used at exposed concrete surfaces where no beddings or adhesive will be applied.
   1. Chemical Hardener by Sonneborn Building Products, Inc. / BASF,
   2. Construction Chemicals by Building Systems or approved equal.
   3. Concrete Floor Hardener by Sweeney Materials, Inc.

D. Non-shrink Cement Grout: Shall be ready-to-use non-metallic aggregate product requiring only addition of water at job site. Grout shall be easily workable and shall have no drying shrinkage at any age. Compressive strength of grout (2 inch by 2 inch cubes) shall not be less than 5000 psi at seven days and 7500 psi at 28 days.
   1. Manufacturer List. Subject to compliance with requirements, provide products by one of the following:
   2. W. R. Grace & Co
   3. Sonneborn Building Products, Inc. / BASF
   4. Sakrete Company
   5. Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.

E. Threaded Inserts and Dowels: Shall be structural concrete insert of type shown on Drawings. Galvanize all components in accordance with ASTM A 153, unless indicated to be stainless steel.
   1. Manufacturer List. Subject to compliance with requirements, provide products by one of the following:
   2. Hohmann and Barnard, Inc.
   3. Richmond Screw Anchor Co.
   4. Superior Concrete Accessories Inc.
   5. Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.

F. Waterstops: Provide flat, dumbbell type or center bulb type waterstops at construction joints, or other joints as indicated on the Drawings.
   1. Waterstops shall be constructed of thermoplastic in accordance with The Corps of Engineers CRD-C572.
   2. Waterstops shall be continuous using splices as recommended by the manufacturer so as to prevent the passing of water through the joint.

G. Preformed Joints: Install as per the manufacturer's instruction the following material to form the control joint at all slabs on grade.
   1. Acceptable Products and Manufacturers:
   2. Keyed Kold Joint by The Burke Co., San Mateo, California.

3. Kold Seal Zipper Strip by Vinylex Corporation, Knoxville, Tennessee
4. Preformed Control Joints by W. R. Meadows.
5. Substitution Limitations: See Section 01 25 00 – SUBSTITUTION PROCEDURES.

H. Under-slab Rigid Insulation: As specified at Section 07 21 00 – THERMAL INSULATION.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - QUALITY REQUIREMENTS, and as follows:
   1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting Work performance.
   2. Verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are as required by each manufacturer, and ready to receive Work.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 ERECTION OF FORMWORK

A. Use forms for all concrete, including footings, except as otherwise permitted in writing by Architect and/or the SER. Design and construct concrete forms to withstand all forces, including construction live loads imposed upon them during placing and curing of concrete, and with adequate bracing to hold them within specified tolerances for lines and grades shown on Drawings as specified under ACI 347.

B. Before reinforcement is placed on or against formwork, formed surfaces coming in contact with fresh concrete shall be cleaned and then treated with approved form release agent.

C. Before form materials can be re-used, surfaces that will be in contact with freshly cast concrete shall be thoroughly cleaned, damaged areas repaired and projecting nails withdrawn. Re-use of form material shall be subject to review by the Architect and/or the SER.

D. Tolerances for formed surfaces: Produce formed concrete work to the dimensions shown on the Drawings within the tolerances given in ACI 347.78, Article 3.31. The tolerances are the maximum allowable dimensional departure from the planes and points established by the Drawings, subject to the maximum rate of change in plane equal to the tolerance dimension and distance first stated in Article 3.3.I for each category of work.

E. Tolerances for Architecturally exposed concrete formed surfaces: Surfaces permanently exposed to view shall be considered “Class A” finish, with no abrupt or gradual surface irregularity in excess of 1/8 inch within a five foot measured dimension.
   1. Abrupt irregularities are defined to include offsets and fins resulting from displaced, mismatched or misplaced forms, surface defects in form materials, sheathing or liners, and voids within concrete due to improper vibrating.
   2. Gradual irregularities are defined to include those resulting from warping, deflection or bending of formwork or similar variations from planeness. Gradual irregularities will be measured with a straightedge for flat surfaces.
   3. Rejection of Exposed Formed Concrete: Any Architectural Concrete that does not conform to the requirements of ACI 347, Article 5.2 for appearance and quality or the requirements stated herein, when forms are removed, is subject to rejection by the Architect and/or the SER. Rejected work shall be removed and replaced at the General Contractor's expense.

3.03 PLACING OF REINFORCEMENT

A. Reinforcement shall be placed in accordance with requirements of CRSI (MSP) "Placing Reinforcing Bars" and with further requirements below.

B. Heating, bending, tack welding, curing or substituting reinforcement in field is prohibited, other than as shown on Drawings.

C. Reinforcement shall be continuous through construction joints, unless otherwise indicated on Drawings.

D. Reinforcement shall be spliced only in accordance with requirements of Contract Documents. Splices of reinforcement at points of maximum stress shall generally be avoided. Welded wire reinforcement shall lap 12 inches or two spaces, whichever is larger, and shall be wired together.

3.04 VERTICAL JOINTS

A. Construction and control joints indicated on Drawings are mandatory and shall not be omitted.

B. Construction joints shall be continuously bevel keyed, two inches by four inches nominal, except as noted, and first placed surface shall be treated as specified under "Placing Concrete" in this Section.

C. Joints not indicated or specified shall be placed to least impair strength of structure and shall be subjected to review of the SER.

3.05 INSTALLATION OF EMBEDDED ITEMS

A. Conform to requirements of ACI 318, Chapter 6, paragraph 6.3, "Conduits and Pipes Embedded in Concrete", and as specified below.

B. Installation of inserts required by other trades, shall be coordinated with, or shall be installed prior to, placing of reinforcing steel. All inserts shall be supplied by respective trades and installed by the General Contractor.

3.06 INSTALLATION OF UNDER-SLAB VAPOR RETARDERS OR BARRIERS AND INSULATION

A. Install insulation in conformance with the manufacturer’s printed instructions specific to the application, accepted shop drawings, and Section 07 21 00 – THERMAL INSULATION.

B. Examine surfaces to receive membrane. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

C. Install vapor retarder or barrier in conformance with manufacturer’s printed instructions and these specifications.

1. Overlap edges of sheets six inches and tape joints using manufacturer’s sealing tape.
2. Seal all penetrations by piping, conduits, rebar or other penetrant items with manufacturer’s mastic and/or sealing tape.
3. Seal vapor barrier sheet to surrounding vertical surfaces as shown on Drawings.
4. Protect installed vapor retarder from damage and perforation following installation. Sequence installation so that sheet will not be exposed to traffic without protection for extended periods of time.
5. Prior to concealing vapor barrier, notify the Architect to arrange for evaluation of the in-place material for damage including perforations.
6. Repair all damaged areas per the manufacturer’s recommendations, or replace products if repair is not acceptable, as identified by the Architect.

3.07 SLAB ON GRADE JOINTS

A. Control joints in the slab on grade shall be made by either of the following methods:

1. Saw Cutting: Saw cutting shall be accomplished using a "Soff-Cutt" saw or approved equal.
2. Saw cutting shall begin immediately after final finishing.
3. Where saw cut joints may read through floor finishes, fill joint with grout prior to installing proposed finish.
4. When slab curl occurs at saw-cut joints that will be visible through floor finishes or is unacceptable to the manufacturer or installer of applied finishes, grind, fill or repair slabs per corrective work requirements of this section.
5. Preformed Joints: Install as per the manufacturers instruction material to form the control joint at all slabs on grade.

3.08 MIXING, CONSISTENCY, AND DELIVERY OF CONCRETE

A. Concrete shall be ready-mixed and produced by a plant acceptable to the SER and the Testing Agency. Hand or site mixing shall not be done. Constituents, including mixture, shall be batched at the central batch plant. Admixtures shall be premixed in a solution form and dispensed as recommended by the manufacturer.

B. For normal weight concrete, water may be added to the concrete at the site only to make up water withheld at the plant. Batching plant shall document on the driver's delivery ticket any water withheld at the plant. When water has not been withheld and slump is too low for proper handling of concrete, use the HRWR admixture to bring slump within specified range.

C. Ready-mix concrete shall be transported to site in watertight agitator or mixer trucks loaded not in excess of rated capacities.
   1. Discharge at site shall be within one and one-half hours after cement was first introduced into mix.
   2. When air temperature is between 85 to 90 degrees Fahrenheit, discharge at site shall be within 75 minutes and when air temperature is above 90 degrees Fahrenheit, discharge site shall be within 60 minutes.
   3. Concrete with a temperature greater than 90 degrees Fahrenheit shall not be placed.
   4. Central mixed concrete shall be plant mixed a minimum of five minutes.

D. Re-tempering of concrete that has partially hardened, that is, mixing with or without additional cement, aggregates, or water, will not be permitted.

3.09 PLACING CONCRETE

A. Remove water and foreign matter from forms and excavations. Except in freezing weather or as otherwise directed, thoroughly wet wood forms just prior to placing concrete. Place no concrete on frozen soil, ice or standing water, and provide adequate protection against frost action during freezing weather.

B. Soil bottom for slabs and footings, reinforcing, inserts, and forms shall be reviewed by Architect or his designate and/or the SER before placing concrete.

C. To secure full bond at construction joints, surfaces of concrete already placed, including vertical and inclined surfaces, shall be thoroughly cleaned of foreign materials and laitance, roughened with suitable tools such as chipping hammers or wire brushed, and re-cleaned by stream of water or compressed air.
   1. Well before new concrete is deposited, joints shall be saturated with water.
   2. After free or glistening water disappears, joints shall be given thorough coating of neat cement slurry mixed to consistency of very heavy paste.
   3. Surface shall receive coating of at least 1/8 inch thick; this shall be scrubbed in by means of stiff bristly brushes.
   4. New concrete shall be deposited before neat cement dries.

D. Do not place concrete having a slump outside of allowable slump range.

E. Transport concrete from mixer to place of final deposit as rapidly as practical by methods which prevent separation of ingredients and displacement of reinforcement and which void re-handling. Deposit no partially hardened concrete. When concrete is conveyed by chutes, equipment shall be of such size and U-shaped design as to insure continuous flow in chute. Flat (coat) chutes shall not be employed.

F. During and immediately after depositing, concrete shall be thoroughly consolidated by means of internal type mechanical vibrators.

G. Vertical lifts shall not exceed 18 inch Vibrate through successive lifts to avoid pour lines. Vibrate first lift thoroughly until top of lift glistens to avoid stone packets, honeycomb, and segregation.

H. Concrete shall be deposited continuously and in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within section.
   1. If section cannot be placed continuously between planned construction joints, as specified, field joint and additional reinforcement shall be introduced so as to preserve structural continuity.
   2. Notify Architect and/or the SER of each such case.

I. Cold Weather Placement – comply with ACI 306.1 and as follows:
   1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing conditions or low temperatures.
   2. Follow ACI cold weather placement procedures when concrete is placed at or below an ambient air temperature of 40 degrees Fahrenheit; or, whenever, in the opinion of the National Weather Service five-day weather forecast, the temperatures are likely to be below 40 degrees Fahrenheit within 24 hours after placement of concrete. Maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   3. Do not use frozen materials or materials containing ice or snow.
   4. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   5. Do not use calcium chloride, salt or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

J. Hot Weather Placement – Comply with ACI 305 and as follows:
   1. Maintain concrete temperature below 90 degrees Fahrenheit at time of placement. Chilling mixing water 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 the General Contractor's option.
   2. Fog-spray forms, steel reinforcement and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots or dry areas.

K. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of the construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   2. Maintain reinforcement in position on chairs during concrete placement.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Slope surfaces uniformly to drains where required.
   5. Begin initial floating using bull floats or derbies to form a uniform and open-textured surface plane, before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
   6. During placement of concrete on slabs-on-deck, do not pile concrete. Place concrete uniformly to prevent excessive deflection of the deck and the beams.

3.10 FINISHING OF UNFORMED CONCRETE SURFACES

A. Required concrete finishes shall conform to ACI 301 and ACI 302 as follows:
   1. Concrete slabs-on-grade shall be finished with floor flatness and levelness tolerances in accordance with ACI 302-8.15 with an Ff = 35 for Specified Overall Value (SOV) and Ff = 25 for Minimum Local Value (MLV) and Fl = 25 for Specified Overall Value (SOV) and Fl = 20 for Minimum Local Value (MLV).
   2. Concrete slab-on-deck shall be finished with floor flatness tolerances in accordance with ACI 302-8.15 with an Ff=30 minimum.

3. When another finish is to be added or applied to a concrete slab, refer to the manufacturer and sub-contractor for required floor flatness, levelness, and/or tolerance. If these requirements are different from those specified, the more stringent requirements shall apply.

B. Scratched Finish: Shall be provided on concrete slabs, which required bond for subsequent topping, or second slab cast over the first. Location: (see Drawings) Method: per ACI 301-5.3.4.2a (steel rakes).

C. Steel Trowelled Finish - Location: All interior slabs, tops of equipment pads. Method: Per ACI 301-5.3.4.2c.

D. Floated Finish: Location - All depressed slabs receiving another finish. Method: Per ACI 301-5.3.4.2b.

E. Light Broom Finish: Location – entrance frost pads.

3.11 CURING AND PROTECTION

A. When concrete is placed at or below an ambient air temperature of 40 deg F, or, whenever, in the opinion of the National Weather Service five-day weather forecast, the temperatures are likely to be below 40 deg F within 24 hours after placement of concrete, cold weather concreting procedures, according to ACI 306 and as specified herein, shall be followed.

1. To this end, the entire area affected shall be protected by adequate housing or covering and heating.
2. No salt, chemicals, or other foreign materials shall be used in mix to lower freezing point of concrete.

B. Protect concrete work against injury from heat, cold, and defacement of any nature during construction operations.

C. Concrete shall be treated immediately after concreting or cement finishing is completed, to provide continuous moist curing above 50 degrees Fahrenheit for at least six days, regardless of ambient air temperatures, unless noted otherwise.

D. Keep permanent temperature record, showing date and outside temperature for concreting operations.

1. Thermometer readings shall be taken at start of work in morning, at noon, and again late in afternoon. Locations of concrete placed during such period shall likewise be recorded, in such manner as to show any affect temperatures may have had on construction.
2. Copies of record shall be distributed daily to the SER and the Testing Agency.

E. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. 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 7 days.
2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
3. In order to avoid plastic or drying shrinkage cracks during warm, dry or windy weather, ACI 302 and ACI 309 shall be followed using wind breaks and sun shades when recommended. Evaporation retardant shall be as specified in Part 2 above.

F. Curing Methods – Provide moisture 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 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.12 REMOVING FORMWORK

A. The General Contractor shall be responsible for proper removal of formwork.

B. Forms shall be removed only after concrete has attained 40 percent of the specified 28 day design strength. Construction loads and lateral loads should be placed without damage to the structure or cause any excessive deflection.

3.13 FINISHING OF ARCHITECTURALLY EXPOSED FORMED CONCRETE

A. Concrete that will be exposed in the completed work shall receive smooth form finish conforming to ACI 301, and sandblast treatment.
   1. Apply sandblasted finish to exposed concrete surfaces at least 72 hours after placement of concrete. Coordinate with concrete placement schedule and formwork removal to ensure that surfaces to be blast finished are blasted at the same age for uniform results.
   2. Use an abrasive grit of proper type and gradation to provide brush sandblast finish – do not expose aggregates.
   3. Perform sand blast finishing in as continuous an operation as possible utilizing the same work crew to maintain continuity of finish on each surface or within each area.

3.14 FIELD QUALITY CONTROL

A. Field Tests and Inspections per Section 01 40 00 – QUALITY REQUIREMENTS, and as follows:
   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.
   2. Materials and workmanship shall be subjected to inspection and testing in mill, shop, and/or field by the SER and/or the Testing Agency.
   3. Such inspection and testing shall not relieve the General Contractor of his responsibility to provide his own inspection, testing and quality control to furnish materials and workmanship in accordance with requirements of Contract Documents.
   4. 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 work. Such notification shall be made at least 24 hours in advance.
   5. Compression tests shall consist of one set of five cylinders for each test made, cured, and tested by the Testing Agency during progress of job as a minimum. One cylinder will be tested at seven days and three cylinders will be tested at 28 days. One cylinder shall be retained to be tested at 56 days if the 28 day results are not acceptable and this cylinder may be discarded if not tested. One set of cylinders shall be taken for every 50-cubic yards of concrete or fraction thereof and furthermore shall be taken from batch with highest slump.
   6. Material and/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 General Contractor to the satisfaction of the SER at no expense to the Owner.

B. In addition to the Owners independent Testing Agency, the General Contractor shall hire a testing agency to prepare and test concrete cylinders, as required, for their use and certification of foundations prior to steel erection.

C. Non-Conforming Work per General and Supplementary Conditions, and as follows: Remove, Repair and Reinstall or Restore in Place damaged items prior to inspection for Substantial Completion.
   1. Finish touch-up damaged surfaces.
   2. Replace damaged materials or items with new if repair not acceptable to Architect.

3.15 CORRECTIVE WORK AND CRACK SEALING

A. Provide crack sealing for exposed concrete surfaces that develop cracks beginning at placement and through the one year correction period beginning on the date of Final Completion.
   1. Seal material shall be non-staining and resilient, matching the concrete color.

2. Corrective work on defects and crack seal shall be performed subject to review of the Architect and/or the SER.
3. Corrective work and crack sealing shall include all required labor, materials, and equipment.

3.16 CLEANING AND PROTECTION

A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Concrete surfaces shall be cleaned of all form release agent stains in one complete operation in the manner indicated by the manufacturer and reviewed by the Architect and/or SER.
   1. Caution to be exercised to avoid staining from work overhead.
   2. Concrete cleaning shall commence when concrete is at least 28 days old, unless otherwise directed by Architect and/or SER.

C. Protect concrete slab surfaces immediately after curing.
   1. Do not permit the following activities to take above concrete surfaces to be polished:
      a. ANY type of storage within 28 days of concrete placement.
      b. Vehicle parking
      c. Pipe cutting operations
      d. Ferrous metals storage

D. Protect installed work from construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 03 30 00.13
CAST-IN-PLACE CONCRETE (SITE)

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Concrete base under unit pavers.
   2. Concrete landscape walls; non-structural.
   3. Concrete curbs.
   4. Concrete mow strip below fencing.
   5. Concrete footings.
   6. Architectural concrete with smooth form finish and smooth rubbed finish at designated walls.

B. Related Sections:
   1. Section 04 43 00 "STONE SITE MASONRY" for slabs and footings.
   2. Section 32 18 16.13 “PLAYGROUND PROTECTIVE SURFACING” for cast-in-place curbs adjacent to protective surfacing under and around playground equipment.
   3. Section “31 00 00 “EARTH MOVING” for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
   4. Section 31 50 00 "EXCAVATION SUPPORT AND PROTECTION” for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
   5. Section 32 12 16 “ASPHALT PAVING” for adjacent asphalt | bituminous concrete paving construction.
   6. Section 32 12 16.13 “ASPHALT | BITUMINOUS CONCRETE PAVING (PEDESTRIAN)” for adjacent asphalt | bituminous concrete paving construction.
   7. Section 32 13 73 "CONCRETE PAVING JOINT SEALANTS" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt | bituminous concrete paving or adjacent construction.
   8. Section 32 13 13.13 “CONCRETE PAVING (SITE)” for concrete pavement and walks.
   9. Section 32 14 13 “UNIT PAVING ON BITUMEN SETTING BED” for paving units on bituminous setting bed on concrete slab
   10. Section 32 17 26.13 - DETECTABLE WARNING SURFACE-RADIAL for radial detectable warning panels.

C. Design Requirements: design, engineering and construct formwork, shoring and bracing to conform to design and code requirements, resultant concrete to conform to required shape, line and dimension.

1.03 REFERENCES

A. The following Standards shall apply to the Work of this Section:
   1. ACI: American Concrete Institute, latest edition:
      Specification for Tolerances for Concrete Constructions and Materials: 117-10
      Specifications for Structural Concrete: ACI 301.
      Guide for Measuring, Mixing, Transporting and Placing Concrete: 304R.
      Hot Weather Concreting: 305R.
      Standard Specifications for Cold Weather Concreting: 306.1.
      Standard Practice for Curing Concrete: 308.

Building Code Requirements for Structural Concrete and Commentary: 318.
Detailing Manual: SP-66.

2. ASTM: American Society for testing and Materials, latest edition:
   Specification of Concrete Aggregates: C33.
   Ready-Mixed Concrete: C94.
   Portland Cement: C150.
   Air Entraining Admixture for Concrete: C260.
   Chemical Admixtures for Concrete: C494.
   Blended Hydraulic Cements (Metric): C595M.
   Chemical Admixtures for Use in Producing Flowing Concrete: C1017.
   Packaged Dry, Hydraulic Cement Grout (Nonshrink): C1107.
   Preformed Expansion Joint Filler for Concrete (Bituminous Type): D994.
   Concrete Joint Sealer, Hot-Poured Elastic Type: D1190.
   Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types): D1751.
   Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction: D1752.

1.04 PRECONSTRUCTION CONFERENCE

A. Attend a preconstruction conference prior to the start of architectural concrete construction. Discussion will include the following:
   1. The General Contractor's program to obtain the specified quality of architectural concrete.
   2. The procedures and methods of construction of preconstruction mockups specified herein.

1.05 ACTION SUBMITTALS

A. Submit the items listed in this section below to the Landscape Architect for review in time to allow for review and resubmittals, if needed, without delaying the work. Do not order materials or start work before receiving the Landscape Architect's written acceptance for all submittals.

B. Product Data: For each type of product indicated.
   1. Manufacturer's Data Sheets.
   2. MSDS (SDS) Sheets.

C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Mix identification designation (unique for each mix submitted).
   2. Statement of intended use for mix.
   3. Method used to determine the proposed mix design.
   4. Compressive Strength at Seven and Twenty-Eight Days: Submit strength test records, mix design materials, conditions, and proportions for concrete used for record of tests, standard deviation calculation, and determination of required average compressive strength. The submission shall be in accordance with ACI 318.
   5. Certification of aggregate compliance with ASTM C33, including gradation of fine and coarse aggregates, with testing data confirming proposed coarse aggregate meets ASTM C33 class designation. Include ASTM test results for aggregates subject to freeze-thaw environment.
   6. Proportions of all ingredients, including all admixtures to be added either at the time of batching or at the jobsite.
   7. Water-to-cementitious-materials ratio.
   8. Slump tested in accordance with ASTM C143.

9. Air content of freshly mixed concrete by the pressure method, ASTM C231, or the volumetric method, ASTM C173.
10. Unit Weight of Concrete: ASTM C138.
11. Mill test reports of portland cement chemical and physical analysis and certification of compliance with ASTM C150 Type I/II.
12. Mill test reports of fly ash chemical and physical analysis and certification of compliance with ASTM C618 Class C or F, if used.
13. Mill test reports of slag chemical and physical analysis and certification of compliance with ASTM C989, if used.
14. Manufacturer's Spec Data Sheets of each concrete admixture, including brand name, manufacturer, and dosage rate range.
15. Certification following the procedure presented in ASTM C1778, that coarse and fin aggregates are nonreactive in the presence of alkalis in accordance with ASTM C1260 or ASTM C1293.
16. Indicate amounts of mixing water to be withheld for later addition at Project site.

D. Concrete mixing, placement, sloping and grade control, curing, and protection procedures.

E. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Shop drawings shall be reviewed and accepted by Landscape Architect and/or Owner Representative prior to fabrication.

F. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
   1. Submit formwork shop drawings.
   2. The Shop Drawings shall bear the seal of the professional engineer licensed to practice in the Commonwealth of Massachusetts who is responsible for determining the need for and designing the shoring system. The Shop Drawings shall include, without limitation, the shoring system layout, and details. The Shop Drawings shall be based on actual field measurements of the existing structural elements.

G. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   1. Location of construction joints is subject to acceptance of the Owner Representative.

1.06 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Semi-rigid joint filler.
   6. Joint-filler strips.
   7. Repair materials.

B. Qualification Data: For Installer, manufacturer, and testing agency.

1.07 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.08 QUALITY ASSURANCE

A. Specification for Tolerances for Concrete Construction and Materials: 117-10.

B. Conform to Specifications for Structural Concrete: ACI 301 Section 6 – ARCHITECTURAL CONCRETE when performing architectural concrete.

C. Conform to ACI 305R when concreting during hot weather.
D. Conform to ACI 306.1 when concreting during cold weather.
E. Conform to ACI 315 when detailing reinforcement and preparing Shop Drawings.
F. Conform to ACI 318 when performing formwork, reinforcing, and concreting.
G. Wood Formwork: For wood formwork products furnished for Work in this Section, comply with applicable provisions of AF&PA National Design Specifications for Wood Construction.
H. Installation Contractor Qualification: The Installation Contractor and its site superintendent shall have at least five years of experience supervising the installation of similar concrete specified in this Section.
I. 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.
J. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
    1. Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
    2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
K. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
L. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
M. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
    1. ACI 301, "Specifications for Structural Concrete," unless modified by requirements in the Contract Documents.
    2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
N. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
O. Quality Assurance Testing during Construction
    1. General: The Owner will employ an independent Testing Agency to perform tests and to submit test reports. The Owner’s Testing Agency will conduct the following quality assurance tests at any time and location.
        a. Sampling and testing of ready-mix concrete for slump, air content, and seven- and twenty-eight-day compressive strengths.
        b. Examining new concrete for any defective work, such as cracking, and honeycombing.
P. Mockups: Construct a sample panel of each cast-in-place concrete wall type with panel joints, wall ties, reveals, and other appurtenances on the corresponding specified base and setting bed before start of any cast-in-place concrete. Cast concrete formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. General Contractor to refer to ACI 301-16; Section 6 -Architectural Concrete mockup references: 6.1.4.4(a) and (b).
    1. Build mockup of typical cast-in-place concrete in locations as shown on Drawings.
    2. Fabricate and build a completed:
        a. Eight-foot-long, full-height and width sample of each type of wall as applicable.
        b. Eight-foot-long full-height and width sample of vertical and flush landscape edging.
        c. Eight-foot-long full-height and width sample of fence strip.

3. Acceptance of the quality of the workmanship, jointing, edging and cleanliness of cast-in-place concrete after installation shall be obtained from the Architect before permanent cast-in-place installation is started.
4. Accepted samples may be part of the finished Work upon acceptance by Client's Representative.
5. Upon acceptance, samples shall be the standard of quality for walls by individual type. In the event the sample is not acceptable, the General Contractor shall immediately remove the unaccepted sample and submit a new, similarly dimensioned, constructed sample for acceptance.
6. If the original sample is not accepted, the General Contractor shall provide additional samples at no cost to the Owner until an accepted sample is obtained.
7. Notify the Owner's Representative one week in advance of the dates and times when constructed samples will be erected.
8. Protect constructed samples from the elements with a weather-resistant membrane for the duration of the Project.
9. Accepted mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
10. Acceptance of mockups does not constitute acceptance of deviations from the Contract Documents contained in mockups unless Landscape Architect specifically agrees to such deviations in writing.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.10 ADA AND MAAB COMPLIANCE

A. Special attention is to be given to compliance with the American with Disabilities Act (ADA) and the requirements of the Massachusetts Architectural Access Board (MAAB).
   1. Slopes: All Walkways as defined by Section 22.1 of 521 CMR shall be graded to a maximum of 4.5-percent. The cross pitch (perpendicular to travel) for all walkways and paths shall be constructed at 1.5-percent (1.9-percent maximum). The slope of all ramps and side slopes of handicap curb cuts as defined by Section 21.1 of 521 CMR shall be constructed at 7.6-percent maximum. Ramps as defined by Section 24.1 of 521 CMR shall be constructed to a maximum slope of 7.6-percent.
   2. The General Contractor is to assume that all grades in pedestrian paths of travel shall be verified/checked with a two-foot electronic "Smart Level".
   3. A five-foot minimum level (1.5-percent pitch, 1.9-percent maximum) area shall be provided at all flush entrances to buildings. Puddling of water at the entrances will not be allowed.

B. The above requirements shall supersede the grades shown on the Drawings. If these requirements cannot be met with the grades as shown on the Drawings, the Owner's Representative shall be notified immediately.

1.11 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When average high and low temperature is expected to fall below 40-degrees Fahrenheit for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and accepted in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and as follows:
   1. Maintain concrete temperature below 90-degree Fahrenheit at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided that the water equivalent of the ice is included in the total amount of mixing water. Using liquid nitrogen to cool concrete is General Contractor's option.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist, without standing water, soft spots, or dry areas.

PART 2 PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete; Exposed to View: Architectural concrete with smooth form finish with smooth rubbed finish. Form-facing panels that will provide continuous, true, and smooth concrete surfaces to match accepted field mockup. Furnish in largest practicable sizes to minimize number of joints. Concrete surface shall comply with ACI 117 tolerance for Class A surface.
   1. Metal accepted panel materials as follows:
      a. Preformed Steel Forms: Minimum 16-gauge; matched; tightly fitting; stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces. Form ties shall be uniformly placed and accurately located in accordance with the layout accepted by the Landscape Architect.
      b. Finish Description/Procedure: Rubbing shall be produced on newly hardened concrete no later than the day following form removal. When required by the Landscape Architect to correct work done in an incorrect manner or in a manner not as specified, rubbing shall commence within 48 hours of notification by the Landscape Architect. Surfaces to be rubbed shall be wetted and rubbed with carborundum brick or other accepted abrasive of equal quality until uniform color and texture are produced, without applying any cement, grout or other coating. Rubbing will not be permitted when the air temperature is expected to fall below 40-degrees Fahrenheit. Rubbing may be performed by use of accepted power equipment and tools, providing that the operational procedures produce the same desired effects as hand rubbing.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another accepted material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Formed Concrete; Concealed from View: At discretion of General Contractor.

D. Form-Release Agent: Commercially formulated form-release agent 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.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than one-inch (25-millimeters) to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than one-inch (25-millimeters) in diameter in concrete surface.
   3. Steel washers shall not be used with snap ties for architectural concrete.

F. Spreaders: Standard, non-corrosive metal from clamp assembly, of type acting as spreaders and leaving no metal within one-inch (25-millimeters) of concrete face. Wire ties, wood spreaders or through bolts are not permitted.

G. Corners: Chamfer, rigid plastic or wood strip; 3/4-inch-by-3/4-inch (19 millimeters-by-19 millimeters) size; maximum possible lengths.
H. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
B. Plain-Steel Wire: ASTM A 1064/1064M, as drawn**.**
C. Deformed-Steel Wire: ASTM A 1064/1064M .
D. Plain-Steel Welded Wire Reinforcement: ASTM A 1064/1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete. Use plastic tips on all chairs in contact with concrete formwork.
C. Tie Wire: minimum 16-gauge annealed type.

2.04 REINFORCEMENT FABRICATION

A. Fabricate concrete reinforcement in accordance with ACI 318 applicable code.
B. Form standard hooks for 180-degree bends, 90-degree bends, and tie hooks, as indicated on Drawings.
C. Form reinforcement bends with minimum diameters in accordance with ACI 318.
D. Locate reinforcement splices not indicated in Drawings, at point of minimum stress. Review location of splices with Landscape Architect.

2.05 CONCRETE MATERIALS

A. Cement: Shall be American-made Portland Cement; and conform to chemical and physical requirements of ASTM C150/C 150M for Type I for exposed concrete and Type II, low alkali, standard gray color for all other work.
B. Aggregate
    1. The sand shall consist of washed, clean, hard, sharp particles.
    2. Aggregate shall be normal weight conforming to ASTM C33.
    3. Following the procedure presented in ASTM C1778, that aggregate shall be nonreactive in the presence of alkalis in accordance with ASTM C1260 or ASTM C1293. Aggregates will be acceptable as non-deleteriously reactive if the aggregate produces ASTM C1567 expansion values of less than 0.1-percent at 14-days using the same source material and relative proportions of cementitious materials proposed for use in the mix design.
    4. Coarse aggregate nominal maximum size for concrete repairs shall be 3/4-inch**.**
C. Chemical Admixtures: Use admixtures according to manufacturer’s written instructions.
    1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
D. Cementitious Materials
    1. Fly Ash: ASTM C618, Class F
    2. Slag: ASTM C989, Grade 100 or 120.
E. Color Pigment: No Color Pigment should be added to concrete mixture.
F. Water: ASTM C 94/C 94M, clean and potable.

2.06 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

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.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.07 MIX PROPORTIONS

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 and ACI 318. For the trial batch method, use an independent testing agency acceptable to Landscape Architect for preparing and reporting proposed mix designs.

1. Do not use the same testing agency for field quality-control testing.
2. Submit written reports to the Landscape Architect of each proposed mix for each class of concrete at least fifteen days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed and accepted by the Landscape Architect of Record.

B. Design mixes to provide normal-weight concrete with the following properties as indicated on Drawings and schedules:

1. Total Cementitious Content: 705-pounds per cubic yard, maximum.
   a. If a low-alkali cement is used to address potential aggregate reactivity, its effectiveness shall be demonstrated by testing according to ASTM C1567.
   b. Limit use of fly ash in concrete exposed to deicing chemicals in service to not exceed 25-percent of cement content by weight. If fly ash contents above 25-percent are required for reactive aggregate mitigation, provide ASTM C666 testing results indicating satisfactory performance.
   c. Limit use of slag in concrete exposed to deicing chemicals in service to not exceed 50-percent of cement content by weight. If fly ash contents above 25-percent are required for reactive aggregate mitigation, provide ASTM C666 and ASTM C672 testing results indicating satisfactory performance.
2. Limit water-soluble, chloride-ion content in hardened concrete to 0.15-percent by weight of cement.
3. 28-Day Design Compressive Strength:
   a. Per ACI 318-14 strength for concrete in exposure class:
      1) F2 (frequent exposure to water) = 4,500 pounds per square inch (31 megapascals), i.e., footings.
      2) F3 (freezing and thawing with exposure to water and deicing chemicals) = 5,000 pounds per square inch (34.4 megapascals), i.e., exposed paving and vertical elements partially or fully above grade.
4. Air Content: Per ACI 318-14 percentage of air required for exposure class F2 and F3 = six percent with a tolerance of plus or minus 1-1/2 percent (4.5 percent to 7.5 percent) based on 3/4 inch maximum-sized aggregate. If another coarse-aggregate size is used, the air content will need to be adjusted to meet minimum air contents as identified in ACI 318 for severe exposure.

5. Slump Limits: five to seven inches.
6. Water to Cementitious Materials Ratio: W/CM shall be 0.40 or less.
7. Do not use calcium chloride.
8. Use accelerating admixtures in cold weather only when accepted by the Owner's Representative. Use of admixtures will not relax cold-weather placement requirements.
9. Use set-retarding admixtures during hot weather only when accepted by the Owner's Representative.

C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by General Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Landscape Architect. Laboratory test data for revised mix design and strength results shall be submitted to and accepted by Landscape Architect before using in Work.

D. Concrete Transit Mixers: Mix concrete materials in transit mixers, complying with requirements of ASTM C 94, and ASTM C1116/C1116M, and furnish batch ticket information.
1. At ambient temperatures of 85 to 90-degrees Fahrenheit, reduce mixing and delivery time to 75 minutes.
2. At ambient temperatures above 90-degrees Fahrenheit, reduce mixing and delivery time to 60 minutes.
3. Provide a batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

E. Concrete shall be vibrated and compacted properly to ensure it can flow freely around the reinforcement and into the formwork without creating areas of honeycombing, segregation, or incomplete filling.

2.08 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber; 1/2-inch (12.7 millimeters), unless otherwise indicated.

B. Bonding Grout: consist of one-part cement, one-part sand, and enough water (± 1/2 part) to form a consistency of thick paint. Sand shall pass the No. 30 sieve.

C. Non-Shrink Grout: ASTM C1107; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2,400-pounds per square inch (16.5-megapascals) in 48 hours, and 7,000-pounds per square inch (48.2-megapascals) in 28-days.

D. Construction Joint Devices: Integral galvanized steel; formed to tongue and groove profile; removable top strip exposing sealant trough; knockout holes spaced at six inches (152.4 millimeters); ribbed steel spikes with tongue to fit top screed edge manufactured by Speed Dowel.

E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-millimeters-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034-inch (0.85-millimeters) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

G. Moisture-Retaining Cover: One of the following, complying with ASTM C171:
1. Polyethylene-coated, blended polyester fabric.
a. HydraCure Wet Curing Cover, PNA Construction Technologies, Inc., 9 Dunwoody Park, Suite 111, Atlanta, GA 30338.

2. Polyethylene film.
3. Polyethylene-coated burlap.

4. Use of curing compounds is strictly prohibited.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
B. Verify requirements for concrete over reinforcement.
C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with non-shrink grout or epoxy.

3.02 SUBBASE

A. Prepare subbase in accordance with Section Section “31 00 00 “EARTH MOVING”.
B. PREPARATION
C. Prepare previously placed concrete by cleaning with steel brush and roughen the surface to 1/4-inch amplitude and applying bonding grout.
D. In locations where new concrete is to be doweled into existing Work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
E. Moisten base to minimize absorption of water from fresh concrete.
F. Coat surfaces of utility covers and frames with oil to prevent bond with concrete pavement.
G. Notify Owner’s Representative a minimum of 24 hours prior to commencement of concrete placement operations.

3.03 FORMWORK GENERAL

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. Limit deflection of facing materials between studs and deflection of studs and walers to 0.0025-times the clear span.
B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 tolerances for Class A surface.
C. Form face, form liners and molds shall result in a concrete surface matching accepted field mockup.
D. Construct forms tight enough to prevent loss of concrete mortar.
E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1-1/2 horizontal to one vertical.
    1. Install keyways, reglets, recesses, and the like, for easy removal.
    2. Do not use rust-stained steel form-facing material.
F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
H. Install chamfer strips on exterior corners and edges of permanently exposed concrete where indicated on Drawings.
I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
J. Clean forms and adjacent surfaces to receive concrete before use and reuse. Do not use forms with surface wears, tears, or defects that would produce concrete surfaces not conforming to accepted mockup.

K. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
L. Retighten forms and bracing before placing concrete to prevent mortar leaks and maintain proper alignment.
M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.04 FORMWORK; CONCRETE EXPOSE TO VIEW

A. Use steel forms.
B. Use clean and smooth plywood and from liners; uniform in size; free from surface and edge damage capable of affecting resulting concrete finish.
C. Install form lining with close-fitting square joints between separate sheets without springing into place.
D. Tape joints to prevent protrusions in concrete.
E. Use care in forming and stripping forms to protect corners and edges.

3.05 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.
    1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
    2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
    3. Install dovetail anchor slots in concrete structures as indicated.

3.06 REMOVING AND REUSING FORMS

A. Do not apply form release agent where concrete surfaces are indicated to receive finishes that are affected by agent.
    1. Saturate inside surfaces of untreated forms with clean water. Keep surfaces wet prior to placement of concrete.
B. 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-release agent.
C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless accepted by Landscape Architect.

3.07 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire. Support reinforcing steel on wire chairs to ensure wire stays mid-depth of sidewalk section during concrete pour.
F. Place reinforcement as indicated.

G. Interrupt reinforcement at contraction expansion joints.

3.08 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
2. Use a bonding grout at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight lines at joints.

D. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.

E. Arrange joints in a continuous line, straight, true and sharp.

3.09 CONCRETE PLACEMENT

A. Place concrete in accordance with ACI 301 and ACI 318.

B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

C. Separate slabs on grade from vertical surfaces 1/2–inch (12.7 millimeter) thick joint filler.

D. Include application of joint filler in the construction schedule within the slab placement sequence. Set top of joint filler to required elevations. Secure joint filler to resist movement by wet concrete.

E. Extend joint filler from bottom of slab to within 1/2-inch (12.7 millimeters) of finished slab surface.

F. Maintain records of concrete placement. Record date, location. quantity, air temperature, and test samples taken.

G. Place concrete continuously between predetermined expansion, control and construction joints.

H. Do not interrupt successive placement; do not permit cold joints to occur.

I. Place slabs as indicated on plans.

J. Screed slabs on grade level, unless otherwise shown on Plans.

K. Provide keyways in footings as indicated on Drawings.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed; Architectural Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Per ACI 117-10, abrupt irregularities shall be measured within one inch of the irregularity. Gradual surface irregularities shall be measured by determining the gap between concrete and near surface of a five-foot straightedge, measured between contact points. Class A surface irregularities are positive 1/8-inch. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive an Architectural finish.
2. It is recommended that the cast concrete is not covered with a coating or covering material applied directly to concrete. All imperfections should be repaired and patched on the original cast concrete surface.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, 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. 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.

3.11 PROTECTING 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. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2-pounds per square foot per hour (one kilogram per square meter per hour) 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. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

E. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including slabs and other surfaces.

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

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-millimeter) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12-inches (300 millimeters), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. All exterior concrete surfaces shall receive one coat of exterior sealer.

G. Protect concrete against rapid drying and damage by rain and/or frost. Appearance of plastic shrinkage cracks may be cause for rejection of the concrete and shall be repaired or replaced at General Contractor’s expense.

H. Protect all concrete work against damage and defacement during subsequent construction operations until final acceptance and full cure.

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: The Owner shall engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports. General Contractor shall provide all required support for testing, including samples of concrete, power for heating/cooling of samples during initial curing, and storage location adjacent to the area of work.

B. Field Inspection and testing will be performed in accordance with ACI 301.

C. Provide free access to Work and cooperate with appointed concrete testing firm.
D. Submit proposed mix design of each class of concrete to the concrete inspection and testing firm for review prior to commencement of Work.
E. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
F. Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed for every truckload of concrete according to the following requirements:
   1. Slump: ASTM C143/C143M; one test at point of discharge for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   2. Air Content: ASTM C231, pressure method, for normal-weight concrete; one test at point of discharge for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   3. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40-degrees Fahrenheit (4.4-degrees Celsius) and below and when 80-degrees Fahrenheit (27-degrees Celsius) and above, and one test for each composite sample.
   4. Unit Weight: ASTM C138 whenever air content is measured.
G. A minimum of seven concrete test cylinders will be taken for each day's placement of each concrete mixture exceeding five-cubic yards (four cubic meters), but less than 25-cubic yards (19 cubic meters), plus one set for each additional 50-cubic yards (38 cubic meters) or fraction thereof of each concrete mixture placed each day. Cylinder Compressive Strength Testing:
   1. Test Method: ASTM C39.
   2. Test Acceptance: In accordance with ACI 318.
   3. Test one Cylinder at seven days.
   4. Test two Cylinders at 28-days.
   5. Retain one cylinder for testing when requested by Owner's Representative.
   6. Dispose remaining cylinders when testing is not required.
H. 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, per Engineer report. The Testing Agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods.

3.13 PATCHING

A. Allow Owner's Representative to observe concrete surfaces immediately upon removal of forms.
B. Appearance of unconsolidated or honeycombed or embedded debris in concrete is not acceptable. Notify Owner's representative upon discovery.
C. Correct deficiencies in the Work that test reports and observations indicate do not comply with the Contract Documents at no cost to the Owner's Representative.

3.14 DEFECTIVE CONCRETE

A. Defective concrete is that which does not conform to required lines, details, dimensions, tolerances or specified requirements.
B. Repair or replacement of defective concrete will be determined by Owner's Representative.
C. Do not patch, fill, touch-up, repair, or replace exposed concrete except under direction of Owner's Representative for each individual area.

3.15 CLEAN-UP

A. Remove all equipment, unused materials, dirt, rubbish, and debris resulting from the performance of this work. Clean existing surfaces of adjoining work of droppings and where stained by concrete.

END OF SECTION

SECTION 03 30 05
MOISTURE VAPOR REDUCING ADMIXTURE FOR CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Moisture vapor reducing admixtures (MVRAs) for placement in interior cast-in-place concrete slab construction.
      a. All new floor slabs in the building interior shall receive moisture vapor reduction admixture, except where specifically noted otherwise on drawings.

1.02 ABBREVIATIONS AND ACRONYMS

A. ACI. American Concrete Institute; www.concrete.org.
B. ASTM. ASTM International; www.astm.org.
C. CDPH. CAL (CDPH). California Department of Health; www.cdph.ca.gov.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ACI PRC-211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide.
C. ASTM D5084 - Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
D. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
E. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
F. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
G. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Product Data: Submit manufacturers' printed data sheets on manufactured products describing admixture and repair (topical application) products, and showing compliance with specified requirements.
      a. Mix Design: Submit MVRA manufacturer's approval of proposed concrete mix design.
   2. Manufacturer's Certification: Certify that products of this section meet or exceed specified requirements.
   3. Material Test Report: Submit test reports performed by a qualified independent testing agency evidencing compliance of products with specified requirements of water-vapor transmission based on comprehensive testing of current products.
   4. Specimen warranty.
   5. Field Quality Control Submittals: Include project name and number, date of MVRA application, name of testing agency, location of concrete batch in work, concrete mix proportions, materials, and test result.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project

Scorecard and 01 81 13 - Sustainable Design Requirements apply to this section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Regional Materials: Extracted, manufactured, and purchased within 100 miles.
        3) Environmental Product Declarations (EPD) and Health Product Declarations (HPD).
        4) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings. Refer to Section 01 81 13 - Sustainable Design Requirements for VOC limits.

D. Closeout Submittals
    1. Submit in accordance with the following:
        a. Section 01 70 00 - Execution and Closeout Requirements.
        b. Section 01 78 00 - Closeout Submittals.
    2. Warranty: Submit executed manufacturer warranty signed by authorized company official within 30 days of completion of concrete slab placement that includes moisture vapor reduction admixture, and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain moisture vapor reducing admixture from a single manufacturer.

B. Toxicity/Hazardous Materials: Provide products that contain no urea-formaldehyde.

C. Repairs to slabs shall be in accordance with ACI standards and shall comply with waterproofing admixture manufacturer’s published details.

D. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, undamaged containers with labels intact.

B. Comply with manufacturer's written MVRA handling instructions prior to mixing.

C. Comply with manufacturer's written MVRA storage instructions. Store protected from exposure to harmful weather conditions and in a temperature controlled area above 36 degrees Fahrenheit. Do not allow product to freeze.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Construction Manager shall correct defective work within a five year period after date of Substantial Completion.

C. Warranty requirements: Work of this section shall be installed according to, and in compliance with, MVRA manufacturer’s published data sheet, including but not limited to dosing instructions, on-site representation requirements, and the use of an ASTM E1745 vapor retarder, installed following ASTM E1643 and ASTM F710 guidelines. Suspended concrete slabs do not require a vapor retarder.
    1. See Section 03 30 00 - Cast-in-Place Concrete for vapor retarder under slabs on grade.
    2. Provide MVRA manufacturer's warranty against moisture related flooring failures.
        a. Warranty Period: Life of the concrete.

b. Warranty Terms: Terms shall include removal of existing flooring, placement of topical moisture remediation system, and replacement of flooring with comparable flooring system, and associated labor.

3. Moisture Vapor Reduction Admixture (MVRA) manufacturer shall provide warranty to match the terms of flooring adhesive manufacturer's material defect warranty in accordance with the MVRA manufacturer's requirements for conveyance of such.

PART 2 PRODUCTS

2.01 MOISTURE VAPOR REDUCING ADMIXTURE (MVRA)

A. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:

1. Concrete moisture vapor reduction admixture for interior slab construction shall be one of the following products:
   a. Concure Systems Admixture: www.theconcuregroup.com.
   b. ISE Logik Industries; MVRA 900: www.iselogik.com.
   c. Specialty Products Group; Vapor Lock 20/20: www.spggogreen.com.
   d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2. Failure to provide a product that meets or exceeds the warranty requirements of PART 1, and the field quality control requirements of PART 3 will result in all subsequent testing and slab remediation costs being borne by the ready mix supplier.

B. Moisture Vapor Reducing Admixture (MVRA): The admixture is designed to have a natural chemical reaction with pre-existing elements inside the concrete to eliminate the route of moisture vapor emission through concrete by closing down the integral capillary system. The chemical reaction forms a permanent barrier (capillary break) which is integral to the concrete and irremovable.

1. Location: Provide admixture in all slabs except as otherwise indicated on drawings.
2. Water Vapor Transmission: 6.0 E-8 cm/sec per ASTM D5084.
3. Odor: None
4. Capillary Break: Sodium based colloidal silica formulation.
5. Toxicity: None.
6. Flammability: None.
7. pH: 11.3.
8. Freeze Temp: 32 degrees Fahrenheit.
9. Solvent: Water.
10. Hazardous Vapors: None.
11. VOCs: None.

2.02 ACCESSORY MATERIALS

A. Provide crack-filling compounds and sealer when required by MVRA manufacturer in order to provide indicated warranty.

B. Underslab Vapor Retarder: See Section 03 30 00 - Cast-in-Place Concrete.

2.03 CONCRETE MIX DESIGN

A. See Section 03 30 00 - Cast-in-Place Concrete for concrete mix design.

B. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates required by manufacturer.

2.04 MIXING

A. Mixers: See Section 03 30 00 - Cast-in-Place Concrete.

PART 3 EXECUTION

3.01 PREPARATION

A. Prepare MVRA-dosed slabs according to manufacturer's written instructions to ensure adhesion of flooring products, in accordance with ASTM F710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   2. Slab Porosity and Adhesion Testing: Perform tests required by manufacturer in order to provide indicated warranty, following each individual adhesive manufacturer's application instructions for use on non-porous substrates if applicable.
   3. Moisture Testing: Not required prior to installation of floor coverings for slabs that include MVRA.
   4. Alkalinity Testing: Not required prior to installation of floor coverings for slabs that include MVRA.

3.02 INSTALLATION

A. A representative or agent of the MVRA manufacturer must be present at the jobsite during the placement of treated concrete. Do not proceed without the manufacturer's representative or agent being present for the certification of the mix and placement process. Provide a minimum of ten days' notice of the placement of the treated concrete.

B. Other admixtures may be used in the same concrete batch with this admixture provided that such admixtures are added separately, and the overall concrete mix is acceptable to the MVRA manufacturer.

C. Place and cure concrete as specified in Section 03 30 00 - Cast-in-Place Concrete, except as modified by this section, if requirements herein are more stringent.

3.03 CURING

A. Concrete containing moisture vapor reducing admixture shall be cured per the admixture manufacturer's instructions, which includes (but is not limited to) curing for a minimum of 48 hours after finishing operations are complete by placing minimum 2 mil polyethylene plastic on the concrete slab.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Project specific quality control process to include but not be limited to:
   1. Procurement of two cylinders per day of placement of concrete containing Moisture Vapor Reduction Admixture:
      a. Perform independent laboratory testing of all cylinders for hydraulic conductivity (coefficient of permeability) per ASTM D5084 and in accordance with warranty requirements.
      b. Assess each cylinder for maximum emissivity of 6.0 E-08 cm/sec.
      c. Should any cylinder exceed the maximum flow, procure a core from that day's placement, and re-test.

C. Field Quality Control Reports:
   1. Submit test results to Architect, Construction Manager, and MVRA manufacturer, within 48 hours of testing.

D. When test results indicate concrete does not comply with specified requirements, conduct additional tests requested by Architect. The cost of additional testing shall be borne by Construction Manager when defective concrete is identified.

END OF SECTION

SECTION 03 45 00
PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Masonry Trade Bid. Refer to Section 04 00 01 - Masonry Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and erecting the following precast architectural concrete work:
   1. Architectural sills at window and curtain wall openings.
   2. Lintels.
   3. Load-bearing and non-load bearing lintels at window and curtainwall openings.
   4. Copings and wall caps at site retaining walls that include masonry veneer, as indicated and detailed in Landscaping Drawings.
   5. Supports, anchors, and attachments.
   6. Stair treads.
   7. Mortar and grout as specified in Section 04 20 00 - Unit Masonry.
   8. Accessories required for a complete installation.

B. Supports, anchors, and attachments.

C. Grouting under panels.

1.03 ABBREVIATIONS AND ACRONYMS

A. ACI. American Concrete Institute: www.concrete.org

B. ASTM. American Society for Testing and Materials: www.astm.org.

C. CDPH. California Department of Public Health: www.cdph.ca.gov.

D. PCI. Precast/Prestressed Concrete Institute: www.pci.org

E. SCAQMD. South Coast Air Quality Management District: www.aqmd.gov.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary.

C. ACI SPEC-301 - Specifications for Concrete Construction.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

E. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric).

F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

G. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

H. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

I. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

J. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

K. ASTM C150/C150M - Standard Specification for Portland Cement.

L. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.

M. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete.

N. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
O. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.
P. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
Q. PCI (CERT) - PCI Plant Certification.
R. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
S. PCI MNL-120 - PCI Design Handbook.
T. PCI MNL-122 - Architectural Precast Concrete.
U. PCI MNL-123 - Connections Manual: Design and Typical Details of Connections for Precast and Prestressed Concrete.
V. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction.
W. SCAQMD 1168 - Adhesive and Sealant Applications.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination.
B. Refer to Section 04 20 00 - Unit Masonry for additional administrative requirements including coordination and meetings.
    1. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
    1. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, and accessory products used.
    2. Test Data: Written reports documenting each proposed mix design for each type of concrete.
    3. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, integral insulation, insulated panel system connectors, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials. Provide erection drawings.
        a. Include details of mix designs.
    4. Structural design calculations for elements supporting loads.
        a. Shop drawings and calculations shall be stamped and signed by a professional engineer licensed in the State of Massachusetts.
    5. Samples: Submit three samples, approximately 6 by 6 inch in size, illustrating surface finish, color and texture.
    6. Provide three 6 inch by 6 inch samples of precast stair tread sandblasted finish.
    7. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.
C. Sustainability Submittals
    1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
    2. The Masonry Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
        a. Include documentation of:

1) Recycled Content: document recycled content of all materials of this Section meeting the criteria of pre-consumer and post-consumer recycled content, listed separately.
   (a) LEED Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete, mix design(s) used showing the quantity of Portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.
2) Regional Materials: Cost of materials extracted, harvested or recovered, and manufactured within 100 miles of the Project site.
3) Environmental Product Declarations (EPD).
4) Health Product Declarations (HPD).
5) Low-Emitting Materials: Document that materials do not exceed VOC limits of either the CAL (CDPH SM), including addenda, or adhesives, sealants and sealant primers must comply with SCAQMD 1168 including amendments. Refer to Section 01 81 13 - Sustainable Design Requirements.
   (a) Paints and Coatings: products applied within the building waterproof barrier layer.

D. Closeout Submittals
   1. Submit in accordance with 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Maintenance Data: Indicate surface cleaning instructions.

1.07 QUALITY ASSURANCE

A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in Massachusetts.

B. Fabricator Qualifications:
   1. Firm having at least 2 years of documented experience in production of precast concrete of the type required.
   2. Plant certified under Precast/Prestressed Concrete Institute PCI (CERT) Plant Certification Program; product group and category A1 - Architectural Precast Concrete, or plant certified under Architectural Precast Association (APA) Plant Certification Program for production of architectural precast concrete.

1.08 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes the work of this section.
   1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, and Section 01 60 00 - Product Requirements, and the following:
   1. Handling: Lift and support precast units only from support points.
   2. Blocking and Lateral Support During Transport and Storage: Use materials that are clean, non-staining, and non-harmful to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.

B. Protect units to prevent staining, chipping, or spalling of concrete.
   1. Mark units with date of production in location that will be concealed after installation.

PART 2 PRODUCTS

2.01 PRECAST UNITS, GENERAL

A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI CODE-318.
   1. Concrete Face Mix: Minimum 5000 psi, 28 day strength, air entrained to 5 to 7 percent; comply with ACI SPEC-301.
      a. Maximum aggregate size: 3/4 inch
      b. Minimum cement content: 520 pounds per cubic yard of concrete.
      c. Slump at point of discharge: 3 inches maximum.
      d. Water absorption: Not to exceed 5 to 6 percent by weight, except between 3 to 4 percent for sloping surfaces at sills.
      e. Use air-entraining admixtures in all precast concrete unless otherwise indicated.
      f. Submit written test reports of proposed mix for each type of concrete in accordance with Part 1 of this Section. Do not begin fabrication until mixes have been reviewed and released by the Architect.
   2. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
   3. Calculate structural properties of units in accordance with ACI CODE-318.
   4. Other Cementitious Materials: Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with strength and appearance requirements.
   5. Finish: Precast to be custom tinted and lightly sand blasted at the "factory" to a sugar-cube cast stone type surface texture matching approved samples and mock-ups.
   6. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
   7. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.
      a. Connections shall be designed to avoid risk of exposure to standing water. All connections to precast elements shall be designed for attachment to vertical ends of sections at head joints. Connections using clips and grooves or recesses in the top edge of sections will not be allowed.

B. Coordinate the location of all support attachment points with Section 05 40 00 - Cold-Formed Metal Framing to assure attachment to light gage metal framing or blocking within walls.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
   1. Deformed billet-steel bars.
   2. Galvanized in accordance with ASTM A767/A767M, Class I.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

B. Fine and Coarse Structural Aggregates: ASTM C33/C33M.

C. Lightweight Structural Aggregate: ASTM C330/C330M.

D. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
   1. Concentration: Base dosage rates on weight of Portland cement, fly ash, silica fume, and other cementitious materials but not aggregate or sand.
   2. Color(s): As selected by Architect from manufacturer's full range.

3. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   a. Butterfield Color; _____: www.butterfieldcolor.com/#sle.
   b. Davis Colors; _____: www.daviscolors.com/#sle.
   c. Lambert Corporation; _____: www.lambertusa.com/#sle.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

F. Fiber Reinforcement: Synthetic fiber shown to be resistant to long-term deterioration when exposed to moisture and alkalis; 1/2 inch length.

G. Air Entrainment Admixture: ASTM C260/C260M.

H. Admixtures for water reducing, retarding, or accelerating curing time: ASTM C494/C494M, type per admixture used, containing not more than 0.1 percent chloride ions.
1. Calcium chloride shall not be used in precast concrete.

I. Grout:
1. Non-shrink, non-metallic, minimum 10,000 psi, 28 day strength.

2.04 FORM LINERS

A. Use forms or form facing materials of metal that is non-reactive with concrete and will produce the required finish surfaces.

2.05 SUPPORT DEVICES

A. Connecting and Support Devices:
1. ASTM A666/A666M, Type 304 stainless steel.

B. Bolts, Nuts, and Washers: ASTM A307 heavy hex bolts, Type A, hot-dip galvanized, with matching ASTM A563/A563M nuts and matching washers.

2.06 FABRICATION

A. Fabricate in compliance with PCI MNL-117 and PCI MNL-135.

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. Fabricate to profiles and shapes as indicated on Drawings.

D. Use form liners in accordance with manufacturer's instructions.

E. Maintain consistent quality during manufacture.

F. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

G. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.

H. Place recessed flashing reglets continuous and straight.

I. Locate hoisting devices to permit removal after erection.

J. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking. Stained units are not acceptable and shall be replaced at the Construction Manager's cost if rejected by the Architect or Owner.

K. Finish: Precast shall have a light sandblast "sugar cube" surface texture matching submittals.

2.07 FABRICATION TOLERANCES

A. Comply with PCI MNL-117 and PCI MNL-135, except as specifically amended below.

Length:	±1/8 inch (± 3 mm)

Length where one face will be installed in dead wall space of mortar joint	±1/4 inch (± 6 mm)
Overall width of units*:	±1/8 inch (± 3 mm)
Location of inserts and appurtenances:	
On formed surfaces:	±1/8 inch (± 3 mm)
On unformed surfaces:	±3/8 inch (± 9 mm)
Overall height of units*	±1/8 inch (± 3 mm)
Total thickness	±1/8 inch (± 3 mm)
Flange thickness	±1/8 inch (± 3 mm)
Flange where one face will be installed in dead wall space of mortar joint	±1/4 inch (± 6 mm)
Size and location of rustications and architectural features	±1/16 in. (± 1.5 mm)
Local Smoothness	±1/8 inch per 5 ft. (±3 mm per1.6 m)

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, surfaces, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are within manufacturer/fabricator acceptance requirements, and ready to receive work.
      b. Verify that building structure, anchors, devices, and openings are ready to receive work of this Section.
      c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 ERECTION

A. General: Erect architectural precast concrete according to ACI standards and fabricator's instructions and recommendations.
   1. Erect units without damage to shape or finish. Replace or repair damaged panels.
   2. Erect units level and plumb within allowable tolerances.
   3. Align and maintain uniform horizontal and vertical joints as erection progresses.
   4. Fasten units in place with mechanical connections.
   5. Exposed Joint Dimension: 3/8 inch. Adjust units so that joint dimensions are within tolerances.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   1. Inspect materials prior to installation for defects and discoloration. Return any damaged, defective, or discolored materials for replacement with new.
   2. Inspect for "bug" holes, honeycombing, spalling, discoloration and other concrete pour defects.

B. All damaged items shall be removed and returned to the manufacturer at no additional cost to the Owner. Reinstall all new items prior to inspection for Substantial Completion.
   1. Replace damaged materials and components with new.

3.04 TOLERANCES

A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135, except as specifically amended below.
   1. Plan Location from Building Grid Datum: Plus or minus 3/8 in.
   2. Top Elevation from Nominal Top Elevation: Plus or minus 3/8 inch.
   3. Exposed Joint Dimension: Plus or minus 3/16 inch.
   4. Maximum Jog in Alignment of Matching Faces or Edges: Plus or minus 3/16 inch.

3.05 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Clean architectural precast with method(s) recommended by the fabricator that meet project requirements.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.
   1. Protect precast during brick masonry cleaning operation, using plastic sheeting or other materials to prevent masonry cleaning products from damaging precast finish. Review protection requirements with Construction Manager and masonry cleaning contractor prior to start of masonry cleaning.

END OF SECTION

SECTION 03 54 00
CONCRETE TOPPINGS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. Portions of the work of this section are assigned to the following:
   1. Resilient Flooring Trade Contractor: See Section 09 00 05 - Resilient Flooring Trade Bid Summary.
   2. Terrazzo Trade Contractor: See Section 09 00 06 - Terrazzo Trade Bid Summary.

B. See Section 00 43 22 - Unit Prices Form for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following Concrete Topping work:
   1. Repair of surface defects in formed concrete.
   2. Finishing of formed surfaces.
   3. Leveling of floor slabs.
   4. Peastone concrete topping slabs at rooms with floor drains, as indicated in drawings and specifications.
   5. Peastone concrete fill at stair treads and landings. See Section 05 51 00 - Metal Stairs.
   6. Filler for cracks and joints in slabs.
   7. Accessories required for a complete installation.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 20 00 - Price and Payment Procedures.

B. Unit Prices: See Section 01 22 00 - Unit Prices: for additional unit price requirements.

1.04 ABBREVIATIONS AND ACRONYMS

A. ACI. American Concrete Institute; www.concrete.org.

B. ASTM. ASTM International; www.astm.org.

C. CDPH. CAL (CDPH). California Department of Health; www.cdph.ca.gov.

D. ICRI. International Concrete Repair Institute; www.icri.org.

1.05 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.

C. ACI 301 - Specifications for Concrete Construction.

D. ACI 503.4 - Standard Specification for Repairing Concrete with Epoxy Mortars.

E. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens).

F. ASTM C150/C150M - Standard Specification for Portland Cement.

G. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

H. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

I. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

K. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

L. ICRI 03732 - Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination, and as follows: Coordinate topping with final flooring finish system.

B. Preinstallation Meeting required per Section 01 70 00 - Execution and Closeout Requirements.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals

1. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
2. Submit data on aggregates used in patching and leveling toppings documenting aggregate meets manufacturer requirements for size and type.
3. Certificate: Certify that products meet or exceed specified requirements.
    a. Certify that concrete patching and leveling products are Portland cement based, with inorganic binders per ASTM C150/C150M.
4. Qualification Statements: Submit manufacturer's documentation that Installer is factory trained and certified as an approved applicator.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The respective Trade Contractor(s) shall provide all documentation indicating applicability of products of their scope of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Regional Materials: Extracted, manufactured, and purchased within 100 miles.
        3) Environmental Product Declarations (EPD) and Health Product Declarations (HPD).
        4) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings. Refer to Section 01 81 13 - Sustainable Design Requirements for VOC limits.
3. Closeout Submittals
    a. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: Company with a minimum of three years of experience specializing in work of the type required by this Section.

1. Peastone concrete topping slabs shall be installed and finished by skilled and experienced workers specializing in the installation and finishing of architectural concrete slabs shall be installed and finished by skilled and experienced workers specializing in the installation and finishing of architectural concrete slabs.

2. Concrete patching and leveling compounds shall be installed by manufacturer-trained and approved applicators, using mixing equipment and tools approved by the manufacturer.

B. Single Source Responsibility: Furnish system materials from one manufacturer for entire Project, unless otherwise indicated in this Section or acceptable to Architect.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.10 FIELD CONDITIONS

A. Do not install underlayment until floor penetrations and peripheral work are complete.

B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.

C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete Slab Patching and Crack Filling Compound: Trowelable latex-modified, Portland cement-based formulation provided or approved by manufacturer for applications indicated.

1. Products: Subject to compliance with these specifications, provide products of one of the following:
   a. Custom Building Products.
   b. Laticrete.
   c. Mapei.
   d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2. Compressive Strength: Minimum 3600 psi after 28 days, tested per ASTM C109/C109M.
3. Final Set Time: 2 hours, maximum for foot traffic, 24 hours for sealing.
4. Thickness: Capable of thicknesses from 1/4 inch to maximum 1/2 inch without addition of aggregate, and up to 1 inch thickness with aggregate.
5. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
6. See Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete. If selected manufacturer's product requires use of a proprietary crack filling compound in order to provide the specified warranty, that product shall be used in lieu of the Concrete slab patching and crack filling compound described in this Paragraph.

B. Self-Leveling Underlayment: Pourable latex-modified, Portland cement based formulation provided or approved by manufacturer for applications indicated.

1. Products: Subject to compliance with these specifications, provide products of one of the following:
   a. Custom Building Products.
   b. Laticrete.
   c. Mapei.
   d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2. Compressive Strength: Minimum 4000 psi after 28 days, tested per ASTM C109/C109M.

3. Final Set Time: 2 hours, maximum for foot traffic, 16 hours for installation of floor finishes at 70 degrees.
4. Thickness: Capable of thicknesses from feather edge to maximum 1-1/2 inch without addition of aggregate.
5. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
6. Mixing:
   a. Site mix materials in accordance with manufacturer's instructions.
   b. Add aggregate for areas where thickness will exceed 1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
   c. Mix to self-leveling consistency without over-watering.

C. Pea-stone Concrete: Comply with Section 03 30 00 - Cast-in-Place Concrete, and the following requirements:
1. Minimum compressive strength at 28 days of 4,500 psi (27.6 MPa).
2. Maximum size of aggregate shall be 3/8 inch (9.5mm).
3. Minimum cement content per cubic yard of concrete shall be 6.5 94-pound (42.6 kg) sacks.
4. Mix design for peastone concrete may include up to ten percent replacement of the cement content with fly ash ASTM C618 along with a plasticizing admixture, conforming with ASTM C1017/C1017M, to provide a dense and plastic concrete mix which will trowel more easily with less surface bleeding of water.

D. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.

E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.

F. Primer: Manufacturer's recommended type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
   a. Verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are within acceptability limits of the manufacturer, and ready to receive work.
   b. Inspect forms, structural slab surfaces, waterproof membranes and protection board where they occur, reinforcement, and embedded items, and obtain Project's structural engineer's approval thereof before placing concrete.
2. Preinstallation Testing: Test substrate surfaces to verify that bond is not impaired. Abrade or otherwise prepare surface to ensure bonding using manufacturer recommended methods.

3.02 PREPARATION

A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.

B. Before placing concrete, broom clean structural slab surfaces and install bond breaker membrane where indicated.

C. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
D. Vacuum clean surfaces.
E. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
F. Close floor openings.

3.03 APPLICATION - CRACK FILLER

A. General: Install Concrete Toppings according to the Drawings, submittals, manufacturer's instructions, per requirements of finish flooring product manufacturer, and as follows:
   1. Install underlayment in accordance with manufacturer's instructions.
   2. Pump or pour material onto substrate. Do not retemper or add water.
      a. Pump, move, and screed while the material is still highly flowable.
      b. Be careful not to create cold joints.
      c. Wear spiked shoes while working in the wet material to avoid leaving marks.
   3. Level irregularities using a trowelable patching or self-leveling compound, compatible with substrate material; follow leveling compound manufacturer’s directions for bonding to substrate.
      a. Fill and patch each construction seam, hole, indentation and irregularity level with the surrounding substrate.
   4. Self-Leveling Underlayments: Provide a dry (less than 5 percent moisture) and smoothly sanded underlayment substrate ready for flooring system installation.
   5. Leave substrate smooth, fully dry and clean, being free of dirt, rust, oil, wax, paint, or other contaminants that will interfere with adhesive bonding or other scheduled finish system. Clean using methods and products compatible with substrate material.
   6. Expansion joints, isolation joints, control joints, or other moving joints in concrete shall not be filled with patching compound.
B. Gypsum based underlayment products are not allowed.
C. Place to thickness to accommodate field conditions, with top surface level to 1/8 inch in 10 ft, or to meet requirements of finished flooring manufacturer / installer if more stringent.
D. For final thickness over 1-1/2 inches, place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.
E. Place after partition installation.
F. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), Aggregate for patching and self-leveling toppings shall meet the manufacturer's requirements for aggregate size. if needed to level and smooth the surface.
G. Steel trowel feathered edges after initial set, but before it is completely hard.

3.04 APPLICATION - SLAB PATCHING AND CRACK FILLER COMPOUND

A. Prepare substrate in accordance with manufacturer’s instructions.
B. Remove all grease, dirt, curing compounds, and any other contaminant that might prevent proper bonding of compound to concrete. Concrete substrate shall be sound, solid, and dry.
C. Over-troweled, frozen, or otherwise weak concrete surfaces shall be cleaned down to sound, solid concrete by mechanical methods in accordance with ICRI 03732 before priming. Acid etching and the use of sweeping compounds and solvents are not acceptable.
D. Level irregularities using a trowelable patching or self-leveling compound, compatible with substrate material; follow leveling compound manufacturer’s directions for bonding to substrate.
   1. Fill and patch each construction seam, hole, indentation and irregularity level with the surrounding substrate.

E. Apply patching and filler compound per manufacturer's printed instructions. Provide primer or bonding agents as recommended by the manufacturer for the field conditions.

F. Expansion joints, isolation joints, control joints, or other moving joints in concrete shall not be filled with patching compound.

3.05 PEASTONE CONCRETE TOPPING SLABS

A. Placement and Finishing Standards: Concrete topping slabs shall be placed, consolidated, and finished in accordance with applicable requirements of ACI 301, and meeting requirements of federal, state, and local accessibility standards.

1. Topping slabs shall be placed and finished monolithically.
    a. Strike off and screed slabs to true, plane surfaces at required elevations, and thoroughly compact concrete with vibrators, floats, and tampers to force coarse aggregate below the surface.
    b. Finish slab within four hours of concrete placement.
2. Slope finished slab to drains as indicated on drawings.
    a. Slope shall be a maximum of 1/8 inch per foot (3mm per 300mm) unless otherwise indicated.
3. Topping Slabs: Provide a "troweled finish" or fine "broom finish" in combination with a "nonslip finish," with “flat” tolerance, as specified in ACI 117.

3.06 REPAIR WORK OF SURFACE DEFECTS

A. Repair Standards: Repair of surface defects shall conform with applicable requirements of ACI 301. When using epoxy mortar, conform with applicable requirements of ACI 503.4.

B. Surface Defects:

1. Repair of surface defects shall begin immediately after form removal. For repair with epoxy mortar, concrete shall be dry.
2. Surface defects are defined to include form-tie holes, air voids or pockets, bug holes with a normal diameter or depth greater than 1/4 inch (6.35mm), honeycombed areas, rock pockets, visible construction joints, fins and burrs.
3. Repair of surface defects shall be tightly bonded and shall result in concrete surfaces of uniform color and texture, matching adjacent surfaces, and free of shrinkage cracks.

C. Repair Work:

1. Remove honeycombed and other defective concrete down to sound concrete.
    a. Saw-cut the edges perpendicular to the surface or slightly undercut.
    b. Feather-edges will not be permitted. Dampen the area to be patched and an area at least 152mm (6 inches) wide surrounding it to prevent absorption of water from the patching mortar.
2. Where rock pockets or similar defects or voids expose steel reinforcement, cutout to solid surface behind the reinforcing steel to provide suitable key-lock for patching mortar.
    a. Patching mortar shall envelope the exposed reinforcing bar.
3. Bond patching mortar to concrete with bonding grout or epoxy adhesive.
    a. Bonding grout shall consist of one part Portland cement to one part No. 30 mesh sand, mixed to the consistency of a thick cream, and then well brushed onto the concrete.
    b. Bond commercial patching mortar to concrete in accordance with the manufacturer's instructions.
4. Make the patching mortar of the same materials and of approximately the same proportions as used for the concrete, except omit the coarse aggregate.

a. Use not more than one part Portland cement to 2-1/2 parts sand by damp loose volume, and substitute white Portland cement for a portion of the regular gray Portland cement to produce patching mix matching the surrounding concrete in color when dry.
b. Determine the proportion of white Portland cement by trial mixes and test areas, prior to repair of actual defective areas.

5. After surface water has evaporated from the area to be patched, brush the bond coat well into the surface.
   a. When the bond coat begins to lose the water sheen, apply the patching mortar.
   b. Compact the mortar into place and strike off so as to leave the patch slightly higher than the surrounding surface.
   c. To permit initial shrinkage, leave the patch undisturbed for at least 1 hour before being finally finished.
   d. Keep the patched area damp for seven days.
6. Neatly finish patched surfaces to match adjacent surrounding surface texture of concrete.
7. For walls exposed in the finish work, form tie holes shall be patched and finished flush with adjacent surface.
   a. For holes passing entirely through walls, a plunger type injection gun or other suitable device shall be used to completely fill the holes.
8. Patching of honeycombed areas or rock pockets that are too large and unacceptable for mortar patching shall be cut out to solid surface, keyed, and packed solid with matching concrete to produce firm bond and flush surface. Patching shall match texture of adjacent surfaces where exposed in the finished work.
9. Repair work in exposed locations that does not match the texture and color of surrounding adjacent surfaces or that was not well performed shall be removed and performed again until the repair work conforms with Specification requirements.
10. Surfaces to receive membrane waterproofing shall have fins and loose material removed, and voids and cracks patched flush with adjacent surfaces.
11. Completed repairs shall be properly cured according to ACI, prior to proceeding with further work in the area of the patch.
12. Cracks shall be filled with latex compound.

3.07 CURING

A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
B. Air cure in accordance with manufacturer's instructions.
C. After cure, seal patching and self-leveling topping compounds with sealer as recommended by the manufacturer for the product and floor finishes to be applied.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Inspect for sloping to drain, and for finish surfaces ready to receive scheduled flooring finish system.
C. An independent testing agency will perform field inspection and testing, as specified in Section 01 40 00 - Quality Requirements.
   1. Placed Material: Agency will inspect and test for compliance with specification requirements.
D. Remove, repair and reinstall, or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Replace damaged materials and components with new if repair not acceptable to Architect.

3.09 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.10 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.
   1. Protect against direct sunlight, heat, rain, and wind; prevent rapid drying to avoid shrinkage and cracking.
   2. Protect exposed concrete slab surfaces to prevent damage from impact or stains.
   3. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

SECTION 04 00 01
MASONRY TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Trade Bids are required for work under this ection in accordance with the provisions of the General Laws of the State of Massachusetts, Chapter 149A, Sections 1-8, 10 and 11, as most recently amended.

B. Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid bond specified therein.

C. Every Trade Bid for work under this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Masonry Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the subcontractor or an entity engaged by the subcontractor, either as an employee or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this section shall include all unit masonry construction for the project and all accessories necessary to provide a complete installation, as shown on drawings, as described in specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on drawings by the section number 04 00 01 or the abbreviation "SC-MASN".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:

1. Section 03 45 00 - Precast Architectural Concrete.
2. Section 04 20 00 - Unit Masonry.
3. Section 04 72 00 - Cast Stone Masonry.

D. The work of this Trade Bid Section shall include part of the scope of each of the following sections:
   1. Section 05 12 00 - Structural Steel Framing: For embed plates, anchor bolts, or other items to be furnished by Division 5 and installed in the masonry work by this Trade Contractor.
   2. Section 05 21 00 - Steel Joist Framing: For embed plates, anchor bolts, or other items to be furnished by Division 5 and installed in the masonry work by this Trade Contractor.
   3. Section 05 50 00 - Metal Fabrications: For loose lintels and anchors furnished by Division 05 and installed by this Trade Contractor
   4. Section 07 21 00 - Thermal Insulation: For cavity insulation in masonry veneer exterior wall systems, as indicated on drawings to be furnished and installed by this Trade Contractor.
   5. Section 07 21 19 - Foamed-In-Place Insulation: For gaps in cavity veneer insulation an as indicated on drawings as to be furnished and installed by Masonry .
   6. Section 07 62 00 - Sheet Metal Flashing and Trim: For installation of thru-wall and other flashings above or adjacent to roofs furnished by Section 07 00 02 and installed by this Trade Contractor.
   7. Section 08 11 13 - Hollow Metal Doors and Frames: For grouting of hollow metal door frames furnished by Section 08 11 13 - Hollow Metal Doors and Frames and set in place by Section 06 20 00 - Finish Carpentry within masonry walls.
   8. Section 14 24 00 - Hydraulic Elevators: For installation and grouting of door frames at hoistway openings, coordination of hoisting beam and safety line beam position, and incorporation of elevator rail anchors into masonry.

E. This Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Commissioning Sections 01 91 13 - MEP Commissioning Requirements and 01 91 19 - Building Envelope Commissioning: list of items to be commissioned and requirements for cooperation with the Commissioning Agent; and required field testing.
   2. Section 03 30 00 - Cast-in-Place Concrete.
   3. Section 05 40 00 - Cold-Formed Metal Framing.
   4. Section 07 14 00 - Fluid-Applied Waterproofing.
   5. Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers.
   6. Section 07 42 13 - Metal Wall and Soffit Panels.
   7. Section 07 42 14 - Metal Composite Material Wall Panels.
   8. Section 07 54 00 - Thermoplastic Membrane Roofing.
   9. Section 07 84 00 - Firestopping.
   10. Section 07 91 00 - Preformed Joint Seals.
   11. Section 07 92 00 - Joint Sealants.
   12. Section 08 36 13 - Sectional Doors.
   13. Section 08 43 13 - Aluminum-Framed Storefronts.
   14. Section 08 44 13 - Glazed Aluminum Curtain Walls.
   15. Section 08 51 13 - Aluminum Windows.
   16. Section 08 56 59 - Service and Teller Window Units.
   17. Section 09 30 00 - Tiling.
   18. Section 09 91 13 - Exterior Painting.
   19. Section 09 91 23 - Interior Painting.

20. Section 10 44 00 - Fire Protection Specialties.
21. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.
22. Division 21: Fire Protection sections.
23. Division 22: Plumbing sections.
24. Division 23: HVAC sections.
25. Division 26: Electrical sections.
26. Division 27: Communications sections.
27. Division 28: Security sections.

F. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

G. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Bidder shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.

H. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

J. Temporary Heat: The Construction Manager shall be responsible for providing adequate enclosure of work areas, which shall include erection of tenting or other similar enclosure of scaffolding provided by this section prior to enclosure of the building. This Trade Contractor shall be responsible for heating materials, including but not limited to CMU, brick veneer, sand, and water, and maintaining heat for installed materials required to complete his work in accordance with applicable standards. The Construction Manager shall be responsible for providing heat to the exterior work area of this section including tented scaffolding, and heat to the work areas within the building footprint once the superstructure and enclosing walls are erected to a point where temporary enclosure is practical.

K. Cutting and Patching:
   1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical sections. Where other sections indicate that cutting and coring of masonry to accommodate the work of those sections is to be performed by this Trade Contractor, the costs shall be borne by the respective other section.
   2. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.

3. Any and all cutting of structural members, including floor slabs, shall require approval of the Structural Engineer of Record; see structural drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those indicated on structural drawings, obtain approval from Structural Engineer of Record.
4. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for reference standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. See each individual technical specification section listed above for required product Information, samples, shop drawings, and other submittals required.

1.06 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.
B. Prior to submission of any product submittals, the Masonry Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.
C. The Masonry Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.07 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.
B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.08 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section, and other components of the exterior walls and roof assemblies.
    1. See Section 01 40 00 - Quality Requirements for exterior building envelope mock-up requirements.

1.09 WARRANTY

A. See each individual technical specification section listed above for specific warranties required.
B. See the following for additional warranty requirements.
    1. Section 01 70 00 - Execution and Closeout Requirements.
    2. Section 01 78 00 - Closeout Submittals.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS)

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

3.01 CLEANING

A. Masonry Trade Contractor shall be responsible for cleaning up Masonry Trade Contractor's work at the end of each day, and depositing waste and debris created by Masonry Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing

recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Masonry Trade Bid. See Section 04 00 01 - Masonry Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Furnish all labor, materials and installation of masonry systems as shown on drawings and/or as specified herein. Includes, but is not limited to, the following items:
   1. Brick veneer.
   2. Unfinished concrete masonry units to receive field finishes, including plain and scored face products.
   3. Concrete unit veneer masonry (CUVM).
   4. Natural stone veneer units.
   5. Mortar and grout.
   6. Cement parging of existing concrete masonry units and precast concrete decorative elements.
   7. Reinforcement and anchorage.
   8. Flashings.
   9. Lintels.
   10. Accessories specified or otherwise required for a complete installation.

B. Products installed by this section but furnished from other sections:
   1. Section 05 12 00 - Structural Steel Framing: anchor bolts and bearing plates.
   2. Section 05 50 00 - Metal Fabrications: elevator hoistway safety beam and loose steel lintels in masonry work, or lintels attached only at one end to structural steel.
   3. Section 07 92 00 - Joint Sealants: Sealants and adhesives within wall flashing assemblies required to facilitate the installation of the work and to seal all penetrations through the VR/AIB membrane and make airtight.
   4. Section 08 11 13 - Hollow Metal Doors and Frames: door frames and anchors for incorporation into masonry walls including grout fill of frames and setting of anchors in masonry coursing. Frames to be set in position by Section 06 20 00 - Finish Carpentry.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASCE. American Society of Civil Engineers; www.asce.org.
B. ASTM. ASTM International; www.astm.org.
C. BIA. Brick Industry Association; www.gobrick.com/Technical-Notes.
D. CAL (CDPH). California Department of Health; www.cdph.ca.gov.
E. NFPA. National Fire Protection Association; www.nfpa.org.
F. TMS. The Masonry Society; www.masonrysociety.org.
G. UL. Underwriters Laboratories; www.ul.com.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASCE 5 - Building Code Requirements and Specification for Masonry Structures.
C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
E. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
F. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement.
G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
H. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
I. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
J. ASTM C90 - Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units.
K. ASTM C91/C91M - Standard Specification for Masonry Cement.
L. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
M. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
N. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
O. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
P. ASTM C426 - Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.
Q. ASTM C476 - Standard Specification for Grout for Masonry.
R. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
S. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
T. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
U. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing.
V. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls.
W. BIA Technical Notes No. 28B - Brick Veneer/Cold-Formed Steel Framed Walls.
X. BIA Technical Notes No. 46 - Maintenance of Brick Masonry.
Y. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
Z. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.
AA. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.
BB. UL (FRD) - Fire Resistance Directory.

1.05 ADMINISTRATIVE REQUIREMENTS

A. See Section 01 30 00 - Administrative Requirements, and the following:
    1. Coordination per Section 01 31 14 - Coordination, and as follows:
        a. Coordinate with installation of other components that comprise the exterior enclosure.
        b. The work of this section includes furnishing and installation of combustible insulation within the exterior wall cavity. Such insulation must be part of a tested wall assembly meeting the requirements of NFPA 285. Selection of insulation materials must be coordinated with the overall wall assembly and the Vapor Retarder / Air Infiltration Barrier (VR/AIB) product being provided by Section 07 00 01 - Waterproofing, Dampproofing, and Caulking Filed Sub-Bid Summary such that they are approved

products listed within the same ICC Evaluation Services approval report, and that the ICC ES report is representative of the designed wall assembly.

B. Preinstallation Meeting required per Section 01 70 00 - Execution and Closeout Requirements, and the following:
   1. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.
C. Sequencing and Scheduling per Section 01 32 16 - Construction Progress Schedule.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals:
   1. Product Data: Provide data for masonry units, fabricated wire reinforcement, reinforcing bars, mortar, lime, mortar coloring, cement parging, and masonry accessories.
   2. Samples: Submit the following samples of units to illustrate color, texture, and extremes of color range:
      a. Brick Veneer: Three sample boards per brick color.
      b. Concrete Masonry Units: Three block samples of each color.
      c. Mortar: Three sets of manufacturer color sample sticks for each mortar to be selected. Submit actual mortar samples; plastic sample kits will not be reviewed.
   3. Stamped Engineering Calculation: Provide stamped engineering calculation for masonry ties spanning cavities greater than 4-1/2 inches, by Engineer licensed in Massachusetts.
   4. Certified Laboratory Test Reports: Submit to Architect certified copies of the reports of all tests listed below; the testing shall have been performed by an approved independent laboratory within six months of submittal of reports for approval. Test reports on a previously tested material shall be accompanied by notarized certificates from the manufacturer certifying that the previously tested materials are of the same type, quality, manufacturer and make as that proposed for this project.
      a. Concrete Masonry Units - Linear drying shrinkage, compressive strength and absorption of each type of unit and pop-out and staining properties of lightweight aggregates used in the units.
      b. Fire Rated Concrete Masonry Units - Equivalent thickness and aggregate type.
      c. Cement: Certified mill test reports of each mill lot.
   5. Shop Drawings: Submit to Architect detailed shop drawings including plans, elevations, and details showing treatment of reinforcing at turns and offsets; intersections of similar and dissimilar materials; tops, bottoms and ends of walls; control and expansion joints; through wall flashing conditions; and wall openings. Shop drawings shall also show details of positioning devices used to hold the vertical reinforcing bars in the proper position within the cells.
   6. Curing and Protection Plan: Submit to Architect detailed methods proposed for curing and protection of concrete masonry construction during normal, hot and cold weather conditions.
   7. Admixture: Admixtures may be used only if accepted in writing by Architect. Submit to Architect detailed information on the composition and benefits of the admixture.
   8. Certify that insulation materials have been coordinated with Vapor Retarder / Air Infiltration Barrier being provided by Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers and products of this section as part of an NFPA 285 tested and approved wall assembly. Submit NFPA test approval and assembly details.
   9. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
C. Sustainability Submittals:

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Masonry Trade Contractor shall provide all documentation indicating applicability of products of this section to potential LEED credits to the project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Regional Materials: Extracted, manufactured, and purchased within 100 miles.
        3) Environmental Product Declarations (EPD).
        4) Health Product Declarations (HPD).

D. Closeout Submittals:
1. See Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Maintenance Materials: Furnish the following for Owner's use in maintenance of project. Deliver to the Owner at location to be designated by the Owner; obtain signature of Owner's Authorized Representative and submit copy of receipt.
    a. See Section 01 60 00 - Product Requirements, for additional provisions.

1.07 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602 and ASCE 5, except where exceeded by requirements of Contract Documents.

B. Fire Rated Assemblies: Comply with MSBC (780 CMR) code for fire resistive requirements for fire rated masonry construction.

C. Foam Plastics in Exterior Wall Construction:
1. Comply with NFPA 285 testing requirements for all exterior non-loadbearing brick veneer walls containing foam plastic insulation.
2. NFPA 285 is a test of a wall ASSEMBLY, and as such the materials and installation techniques of this section shall be coordinated with other materials that are components of the wall assembly. Exterior wall components, including insulation, masonry units and masonry veneer shall be components of a single tested and approved NFPA assembly. Installation of products shall be in conformance with details utilized in the tested assembly configuration.

1.08 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes the work of this section.
1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

B. Unit Masonry Sample Panels: Before installing unit masonry, build sample panels, using materials indicated for the completed work, to verify selections made under sample submittals and to demonstrate aesthetic effects. Build sample panels for each type of exposed unit masonry assembly in sizes approximately 4 feet long by 4 feet high; include mortar in sample panels.
1. Unit Masonry Sample Panels: Before installing unit masonry, build sample panels, using materials indicated for the completed work, to verify selections made under sample submittals and to demonstrate aesthetic effects. Build sample panels for each type of exposed unit masonry assembly in sizes approximately 48 inches long by 48 inches high by full thickness.

2. Locate panels in the locations as directed by Architect.
3. Clean exposed faces of panels with masonry cleaner indicated by masonry unit manufacturer.
4. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
5. Protect approved sample panels from the elements with weather-resistant membrane.
6. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed work.
7. Architect's acceptance of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by the project landscape architect in writing.
8. Acceptance of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels, unless such deviations are specifically approved by Architect in writing.
9. Locate where directed by Architect.
10. Demolish and remove sample panels when directed by Architect.
11. Masonry sample panels may not remain as part of work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s instructions and recommendations, Section 01 60 00 - Product Requirements, and as follows:
   1. All materials shall be delivered, stored, and handled in a manner that they will be fully protected from wetting, staining, chipping, and other damage. Avoid staining, and other discoloration, by the use of suitable materials for storing, moving, or handling.
   2. Store masonry materials on raised timber or platforms, at least four inches above ground, under ventilated, weather-tight covers or indoors. Concrete masonry units shall be kept dry at all times. If wet, allow to dry sufficiently so that no free moisture appears on the surface of the units when used.
   3. Deliver and store cement, lime, and other perishable materials in their original containers, plainly marked with brand name and manufacturer’s name, indoors or in weather-tight sheds with elevated floors.
   4. Protect metal accessories and reinforcement from the elements. Immediately before placing remove all loose rust, dirt, and other foreign materials.
   5. All materials and packaging showing water marks or other evidence of damage or contamination will be rejected and shall be promptly removed from the site.

1.10 ENVIRONMENTAL REQUIREMENTS

A. No frozen work shall be built upon. Before erecting masonry during temperatures below 40 deg F, a written Cold Weather Protection Plan shall be submitted, and approval received for the methods proposed to heat the masonry materials and protect the masonry from freezing.

B. Air temperature on both sides of the masonry shall be maintained above 40 degrees Fahrenheit for at least 72 hours after installation. The Construction Manager shall provide tenting or enclosure of work areas, and heat to work areas. The Masonry Trade Contractor shall provide heat to materials to maintain required temperatures.

C. When outside air temperature is below 40 deg F, heat sand and water before preparing mix. Do not scorch sand, do not use water warmer than 160 deg F. Maintain mortar temperature between 40 and 120 deg F.

D. Parging or other masonry repairs and preparation shall comply with the installation temperature or other environmental conditions required by the manufacturer.

E. Protect masonry from inclement weather with tarpaulins or fiber-reinforced paper held securely in place.
   1. Cover the tops of exposed masonry walls over nights, weekends, and holidays, and when raining, to prevent water entry into wall cavities and efflorescence on materials.
   2. Turn scaffolding plank at night and when raining to prevent spattering of walls.

1.11 TESTING

A. Field inspection and testing of work performed under this section shall be in accordance with testing requirements of the Massachusetts State Building Code, Chapter 17 – Special Inspections and the Program of Testing and Inspections developed by the Structural Engineer of Record. The Owner's testing agency will be present during construction of the work. Construction Manager and Masonry Trade Contractor shall provide proper notification for inspections and testing, coordinate the site visits, and provide safe access to view the work performed under this section.
   1. Cost of initial tests required shall be paid for by Owner.
   2. All costs for retesting of failed materials shall be backcharged to Construction Manager and/or Masonry Trade Contractor, at Owner's discretion.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. General: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as shown on drawings for specific locations.
   2. Special Shapes: Provide nonstandard blocks configured for corners.
      a. Bullnose: Provide for all vertical exposed corners at building interior not scheduled to receive applied rigid finishes such as tile, unless noted otherwise. Bullnose shall be one-inch radius.
   3. Load-Bearing and Non-Load Bearing Units: ASTM C90, having an oven-dry weight of over 125 pounds per cubic foot and maximum moisture absorption of 13 pounds per cubic foot.
      a. Hollow or solid block, provide to fit project conditions indicated.
   4. Compressive Strengths: All units shall have a minimum compressive strength on the net area of 3000 PSI when tested in accordance with ASTM C140/C140M.
   5. The linear drying shrinkage of concrete masonry units shall not exceed 0.065 percent when tested in accordance with ASTM C426.
   6. Where a fire-resistance rating is shown on drawings, provide UL rated products or units meeting that requirement when rated in accordance with the Equivalent Thickness Method of the Massachusetts State Building Code, or fill voids of hollow units with aggregate materials to meet the Equivalent Thickness method.
   7. Acoustic CMU: "SOUNDCELL" with factory-installed noise-attenuating filter:
      a. Manufacturers: Subject to compliance with requirements of these specifications, select equivalent products from one of the following manufacturers:
         1) A. Jandris & Sons; jandrisandsons.com; (Basis of Design)
         2) Trenwyth; www.echelonmasonry.com/trenwyth-masonry.
         3) Westbrook Concrete Block; www.westbrookblock.com.
         4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
      b. Pattern: Running bond.

c. Performance: NRC 0.70 or higher.

2.02 BRICK UNITS

A. Manufacturers: Subject to compliance with these specifications, provide products from one of the following manufacturers:
   1. Brick Veneer Type 1:
      a. Belden Brick; Smoky Gray Velour: www.beldenbrick.com. (Basis of Design)
      b. Yankee Hill Brick; G1 Velour: www.yankeehillbrick.com.
      c. Watsontown Brick; Central Park: www.watsontownbrick.com.
   2. Brick Veneer Type 2:
      a. Belden Brick; Belcrest 550: www.beldenbrick.com. (Basis of Design)
      b. Glen-Gery; Sandford: www.glengery.com.
      c. Watsontown Brick; Bristol Sanded Smooth Flashed: www.watsontownbrick.com.
   3. Brick Veneer Type 3:
   4. (a) Glen Gery; Bermuda Blue Glazed: https://www.glengery.com. (Basis of Design)
      a. Belden Brick; Wrangler Glazed: www.beldenbrick.com.
      b. Elgin Butler; Dynamic Blue: www.elginbutler.com.
   5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Facing Brick: ASTM C216, Type FBS Rough, Grade SW.
   1. Color and texture: As noted in BRICK UNITS Manufacturers sub-paragraph, above.
   2. Nominal size: Type 1 3-1/2 inch bed by 3-5/8 inch high by 11-5/8 inch long.
   3. Special shapes: Molded units to fit conditions indicated, unless standard units can be sawn to produce equivalent effect acceptable to the Architect.
      a. Provide narrow bed brick at inset soldier courses such that the width of the air cavity is not reduced due to inset at face of brick.
      b. Provide solid brick with chamfered top edge at course below inset soldier course brick and similar inset locations where change in place of face of brick is 1/2-inch or greater.
      c. Provide solid brick with chamfered top edge at all projected row lock course brick and similar projected locations where change in place of face brick is 1/2-inch or greater.
      d. Provide lipped brick at loose metal lintels and relieving angles. Combine with other special shape requirements for narrow bed or chamfered brick where they exist - see drawings.
      e. Provide sill brick at windows.
      f. Provide other shapes as shown on drawings.
   4. Provide solid units where application would result in exposure of core holes.
      a. Provide solid units at sub grade locations or grout solid.
   5. Compressive strength: 9000 pounds per square inch, measured in accordance with ASTM C67/C67M.
   6. Provide solid brick below all inset soldier courses and similar conditions with 1/2-inch or greater change in face of brick plane.

2.03 CONCRETE UNIT VENEER MASONRY (CUVM)

A. Manufacturers: Provide all materials from one of the following:
   1. Basis of Design: Shouldice Stone.
      a. Hanover Architectural Products.
      b. Kingston Block & Masonry Supply.

c. York Building Products.
d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. CUVM-1:
1. Color: Desert Bluff
2. Finish: Tapestry without chamfered corners.
3. Sizes:
a. Nominal 12 inches by 24 inches by 3-5/8 inches running bond as shown on drawings.
b. Nominal 4 inches by 24 inches by 3-5/8 inches banding course as shown on drawings.
c. Corners units shall be "L" shaped as shown on drawings.

C. CUVM-2:
1. Color: Desert Bluff.
2. Finish: Rock.
3. Sizes:
a. Nominal 8 inch by 24 inch by 3-5/8 inch banding course as shown on drawings.
b. Corners units shall be "L" shaped as shown on drawings.

D. Building Cornerstone: provide smooth-faced building cornerstone, of same CUVM material and dimensions as adjacent field units, unless otherwise shown on drawings. Indicate year of construction. Confirm year of construction with Architect. Locate cornerstone where shown on drawings. Font, size, and alignment of inscription: as shown on drawings.

2.04 NATURAL STONE VENEER UNITS

A. Manufacturers: Subject to compliance with requirements of these specifications, select equivalent products from the following:
1. Buechel Stone Corp.; www.buechelstone.com: Product: Cinnamon Bark Ledgestone. (Basis of Design)
2. Delgado Stone; www.delgadostone.com. Product: Colonial Tan Ledge.
3. Pinnacle Stone Products, LLC; www.pinnaclestoneproducts.com. Product: Brandywine Ledge.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Dimensions:
1. Length: 4 to 16 inches (8 inches average).
2. Height: 3/4-inch to 2-1/4 inches.
3. Width: 3 to 5 inches (4 inches average).

C. Geology: gneiss.

D. Weight: approximately 170 pounds per cubic foot.

E. Typical Blend: up to 30 percent may be sawn top and bottom with a bedface face; face of stone cannot have a sawn finish.

F. Typical Piece: ends random, natural cleft top and bottom; face and sides natural split or seamface; back sawn; linear stone.

G. Stone Sill Course: same geology and blend as field color:
1. Height: 2-1/2 inch.
2. Bed Depth: 1 inch wider than field material (approximately 6 inches).
3. Length: same as field material.

2.05 GROUT AND GROUT MATERIALS

A. Grout:

1. Proportions: Grout shall conform to ASTM C476 and shall attain a compressive strength at 14 days as listed in the Structural drawings, when tested in accordance with ASTM C91/C91M for fine aggregate and ASTM C39/C39M for grout containing coarse aggregate. Grout shall be used subject to the limitations of Table II.
   a. Fine Grout: Fine grout shall consist of Portland Cement, lime paste or hydrated lime, and fine aggregate mixed with sufficient water to obtain a pouring consistency without segregation of the constituents. Slump shall be between nine and 11 inches.
   b. Low-Lift Grout: Low -lift grout shall consist of Portland Cement, lime paste or hydrated lime, fine aggregate and coarse aggregate mixed with sufficient water to obtain a pouring consistency without segregation of constituents. Slump shall be between nine and 11 inches. Maximum size of coarse aggregate for grout shall be in accordance with Table II.

   TABLE II

   POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS

Minimum Horizontal Dimensions of Core	Minimum Width of Collar Joint	Grout Type	Coarse Aggregate	Maximum Height of Grout Pour (inches)
2 by 3	3/4	Fine or Mortar	None	8
--	2	Fine or Mortar	ASTM C404 Size 8	8
2 by 4	--	Fine or Mortar	None	16
2-1/2 by 4	--	Fine or Low Lift	ASTM C404, Size 8	48

2. Use grout consistency to completely fill cells and volumes indicated for grouting; use fine aggregate grout for spaces with smallest horizontal dimension of 2 inches or less, and coarse aggregate grout for spaces with smallest horizontal dimension of larger than 2 inches.
3. Admixtures may be used in grout provided that the admixture does not affect bond or compressive strength of mortar or grout designed without the use of the admixture. Anti-freeze compounds shall not be used. The admixtures shall not contain calcium chloride salts or any other chemical that will adversely affect metals or the coatings of metals embedded in the mortar or grout.

B. Water: Clean and potable, free from deleterious quantities of acids, alkalis, oils, salts and organic materials.

2.06 PARGING MATERIALS

A. Pre-blended Portland cement based mixture designed for finishing concrete blocks and concrete surfaces.

B. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:

1. Sakrete Parging Mix.
2. W.R. Meadows 825 Parge-All.
3. Quikrete Parging Mix.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Accessories. Mesh, lath, or other reinforcing materials as recommended by the parging mix manufacturer for surfacing or repair of damaged areas.

2.07 REINFORCEMENT AND ANCHORAGE

A. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. FERO Corporation; Rap Tie (Rod Adjustable Plate Tie) with L shaped plate and V-Tie: www.ferocorp.com/#sle.
   2. Hohmann & Barnard, Inc: www.h-b.com/#sle.
   3. WIRE-BOND: www.wirebond.com/#sle.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated. All cells containing reinforcement shall be grouted solid.

C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss.
   2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.
   3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; of width to provide not less than 5/8 inch of mortar coverage on each exposure.
   4. Masonry ties for anchoring unit masonry walls and partitions to intersecting masonry (other than where “tee” reinforcements are specified) and to anchor ends of concrete masonry units where adjoining concrete masonry units of different thickness, shall be 1/4 inch to 1/2 inch mesh size, 16/16 gauge steel mesh, cut to size not less than 12 inches in length and of width 2 inches less than partition width, or other steel tie system acceptable by local codes.
      a. Masonry Tie Finish: Stainless steel.
      b. Provide non-metal spacer where dissimilar metals would otherwise come in contact.

D. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss, with adjustable ties or tabs spaced at 16 inches on center.
   2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.
   3. Size: 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire, width of components shall provide not less than 5/8 inch of mortar coverage from each masonry face.
   4. Vertical adjustment: Not more than 1-1/4 inches.
   5. Basis of Design: Hohmann & Barnard: Ladder 270-2x with rectangular adjustable 3/16-inch wall tie pintles.

E. Masonry Veneer Anchors: Two-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Where masonry veneer cavities exceed 6 inches from back of veneer masonry to face of backup wall, provide engineered veneer anchors suitable to the installation, including substrate, insulation thickness, and veneer product. Comply with TMS 402/602 , Table 13.2.2.3. Submit data for engineered anchors per SUBMITTALS paragraph in PART 1 of this section.
      a. Exterior veneer exceeding 30 feet, or 38 feet at a gable, in height above the vertical support shall be designed and detailed to provide for differential movement and adjustable veneer ties shall meet additional limitations and requirements of TMS 402/602.

2. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
3. Wire ties: Adjustable eye-and-pintle wire loop shape, 0.1875 inch thick. Provide eye and pintle dimensions required to fit cavity conditions and locate eye and hook portion within the cavity beyond the thickness of cavity insulation and within 2 inches of back of veneer wythe, in accordance with TMS 402/602.
    a. Wire Tie Finish: Stainless steel.
    b. Provide non-metal spacer where dissimilar metals would otherwise come in contact.
4. Vertical adjustment: Not less than 3-1/2 inches.
5. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.
6. Concrete Back-Up Fastener: Provide powder-driven anchoring fasteners at concrete structural back-up.
7. Insulation Washers: Provide plastic washers to hold insulation in place.
8. Manufacturer / Product: Subject to requirements provide one of the following:
    a. FERO / Slotted Rap-Tie.
    b. Hohmann & Barnard / HB-200.
    c. Wirebond RJ-711.
    d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

F. Sealant: Waterproofing, Dampproofing, and Caulking Trade Contractor shall confirm compatibility of sealant with installed VR/AIB and shall provide sealant to Masonry Trade Contractor. Masonry Trade Contractor shall individually seal each masonry veneer anchor if installed after VR/AIB.

2.08 FLASHINGS

A. Fabric Copper Flashing; Non-asphaltic fiberglass scrim laminated to flexible copper core; five ounce weight.
    1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
        a. Hohmann & Barnard Inc. Copper-Tuff.
        b. Wire-Bond, Inc.; Copper Seal,
        c. York manufacturing, Inc.; Product Multi-flash 500 series.
        d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Stainless Steel Flashing and Drip Edges: ASTM A666/A666M, Type 304, soft temper; 26 gage (0.45 mm) thick; finish 2B to 2D. Shop fabricated or factory formed to profiles and sizes indicated.
    1. Include integral hemmed drip edge at face of masonry veneer, including shapes to fit lipped brick conditions indicated.
    2. Provide shop or factory-formed, single-piece interior and exterior corner shapes, end dams, and other transition shapes to fit project conditions. All such shapes shall feature continuously welded or soldered water-tight joints. Adhesive and sealant joints and site-formed lapped corners are not permitted.

3. Flashing Termination: Plastic or stainless steel construction, profiled to accept sealing mastic along top edge or continuous fully adhered flashing termination strip compatible with VR/AIB.

C. Flashing Sealant/Adhesives: Type compatible with type of flashing, as recommended by flashing manufacturer, and compatible with Vapor Retarder / Air Infiltration Barrier product.

2.09 ACCESSORIES

A. Joint Filler: Closed cell neoprene sponge; oversized 50 percent to joint width; self-expanding; 3 inch wide by maximum lengths available.
   1. Manufacturers:
      a. Heckmann Building Products; Neoprene Expansion Joints (354): www.heckmannbuildingprods.com
      b. Hohmann & Barnard, Inc; Product NS-Closed Cell Neoprene Sponge: www.h-b.com.
      c. WIRE-BOND; #3300: www.wirebond.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
      a. Manufacturers:
         1) Hohman & Barnard; Mortar Trap.
         2) Mortar Net Solutions; MortarNet: www.mortarnet.com/#sle.
         3) Keene Building Products; Product Keenestone Cut Masonry Drainage Device; www.keenebuilding.com.
         4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Bond Break Fabric: Installed to separate brick and calcium silicate masonry units from precast concrete elements: ASTM D226/D226M, Type I ("No.15") asphalt felt.

D. Brick Veneer Cavity Weeps and Vents; Type: Polyester mesh.

E. Horizontal Weeps:
   1. Dimple formed or channel formed rigid vents and weeps. Subject to compliance with these specifications, provide products of one of the following:
      a. Stone Cavity Weep SCV 5012 by MTI.
      b. Polyguard Horizontal Weep by Integrated Building Envelope.
      c. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

F. Cleaning Solution: Of type not harmful to masonry work or adjacent materials.
   1. Masonry cleaning materials used in interior spaces shall be low- or no-VOC and contain no Toxic / Hazardous Air Pollutants, as defined by the EPA Initial List of Hazardous Air Pollutants with Modifications.

2.10 LINTELS

A. Loose galvanized steel lintels furnished by Section 05 50 00 - Metal Fabrications for installation by Masonry Trade Contractor.

2.11 MORTAR AND GROUT MIXES

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Masonry below grade and in contact with earth: Type S.
   2. Veneer masonry: Type N.
   3. All other masonry: Type S.
   4. Exterior, loadbearing masonry: Type S.
   5. Exterior, non-loadbearing masonry: Type S.
   6. Interior, loadbearing masonry: Type S.
   7. Interior, non-loadbearing masonry: Type S.

B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

C. Admixtures may be used in mortar provided that the admixture does not affect bond or compressive strength of mortar or grout designed without the use of the admixture. Anti-freeze compounds shall not be used. The admixtures shall not contain calcium chloride salts or any other chemical that will adversely affect metals or the coatings of metals embedded in the mortar or grout. Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect surfaces and conditions in areas which masonry work is to be installed. Notify the Construction Manager in writing of conditions which may have a detrimental effect on the timely execution, quality or performance of work of this section.
   1. Verify that field conditions are acceptable and are ready to receive masonry.
   2. Verify that related items provided under other sections are properly sized and located.
   3. Verify that built-in items are in proper location, and ready for roughing into masonry work.

B. Report to Construction Manager in writing each condition in other work or in environment that will adversely affect the execution, permanence or quality of work of this section. Commencement of work shall constitute acceptance of all conditions.

C. Pre-Construction Coordination Conference: Masonry Trade Contractor shall coordinate with Waterproofing, Dampproofing, and Caulking Trade Contractor, Roofing and Flashing Trade Contractor and Construction Manager to review manufacturer’s installation requirements. Flashing/Waterproofing/VR-AIB manufacturer’s representative or technical rep shall attend this meeting and provide instruction and mock-up for typical conditions to ensure proper coordination between trades.

3.02 PREPARATION

A. Chisel or scrape off any loose or flaking existing parging from existing concrete masonry units, concrete surfaces, or precast concrete elements.

B. Using a wire brush, scrape away any excess flakes, dust, and debris.

C. Power wash surfaces to remove vegetative growth, dirt, and particulates.

D. Clean any oil or grease that may prevent adhesion of new parging in accordance with manufacturer recommendations.

E. Prepare adjacent painted parged surfaces to remain to blend in uniformly with new parged or repaired airs.

F. Layout new masonry work in advance to ensure accurate spacing of surface bond patterns, uniformity of joint widths and to properly locate all openings. Avoid the use of less than half-size units at corners, jambs and wherever possible, at other locations.
G. Direct and coordinate placement of metal anchors supplied for installation under other sections.
H. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 DAILY PROTECTION

A. Cover top 2 feet of completed wall at end of each day with plastic to prevent entry of water.

3.04 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602, manufacturer, or applicable building code, whichever is most stringent.
B. Cold Weather Construction
    1. General:
        a. Provide enclosed area for storage of materials and preparation of mortar.
        b. Coordinate with Construction Manager for the enclosed, heated work area for installation. Maintain heat at no less than 40 degrees F on newly built wall for at least 24 hours. Use insulated blankets when the windchill is zero or less.
        c. Avoid rapid drying out by overheating enclosure.
        d. Do not lay masonry on ice or frozen surfaces.
    2. Mortar and Grout
        a. Do not use frozen sand. Heat sand when air temperature is below 32 degrees F.
        b. Use heated mix water (70 degrees to 160 degrees F) when air temperature is below 40 degrees F.
        c. Heat masonry units when air temperature is below 20 degrees F. Unit shall not be less than 25 degrees F when laid.
C. Hot Weather Construction
    1. Lightly wet mortar bedding surface.
    2. Keep mortar moist. Do not string out on wall so far ahead of units so that drying occurs before placing units.
    3. Lightly fog spray completed areas to prevent rapid drying. Use windbreaks to shield area from drying wind.

3.05 EXTERIOR WALL INSULATION

A. Install insulation at masonry veneer cavities as specified in Section 07 21 00.
    1. Coordinate insulation board dimensions with veneer anchor spacing, and with requirements of other exterior wall finish systems.
    2. Compress insulation boards where veneer anchors penetrate to assure tight fit of boards. Seal all joints between boards and at dissimilar materials air tight.
    3. Seal all tears or damage to foil facing with flashing tape recommended by insulation manufacture, such that no insulation foam is exposed to the weather or veneer cavity.

3.06 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.
B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
C. Concrete Masonry Units:
    1. Bond: Running.
    2. Vertical Coursing: One unit and one mortar joint to equal 8 inches.
    3. Mortar Joints: Concave.

D. Brick Units:
   1. Bond: one-third running.
   2. Vertical Coursing: Two units and two joints to equal eight inches.
   3. Mortar Joints: Concave.

3.07 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
B. Lay hollow masonry units with face shell bedding on head and bed joints.
C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
D. Remove excess mortar and mortar smears as work progresses.
E. Interlock intersections and external corners.
F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
H. Provide bond break fabric between precast concrete and other masonry veneer products.
I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.
J. Place precast chimney cap atop chimney masonry; mortar into place; rake back mortar joint 1/2 to 3/4 inch, and seal to protruding flue with same joint sealer system used with adjacent masonry.

3.08 WEEPS / CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.09 GROUTING

A. Grouting Technique: At the Masonry Trade Contractor’s option, use either low-lift or high-lift grouting techniques subject to requirements as follows.
   1. Low-Lift Grouting:
      a. Use “Fine-Grout” in accordance with Table II above.
      b. Provide minimum clear dimension of 2 inches and clear area of eight square inches. in vertical cores to be grouted.
      c. Place vertical reinforcement prior to laying of CMU. Extend above elevation of maximum pour height to allow for splicing. Support in position at vertical intervals not exceeding 192 bar diameters nor 10 feet.
      d. Lay CMU to maximum pour height. Do not exceed five feet height, or if bond beam occurs below five feet height, stop pour at course below bond beam.
      e. Pour grout using chute or container with spout. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pours 1-1/2 inch below top course of pour.
      f. Bond Beams: Stop grout in vertical cells 1-1/2 inch below bond beam course. Place horizontal reinforcing in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.
   2. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry to allow for splicing. Pour grout to within 1-1/2 inches of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence, if more pours are required.

B. Grout masonry cores and hollow metal (HM) frames solid as shown on drawings, and per ASTM C476.
C. Grout solid all hollow masonry to receive anchors or reinforcement.

3.10 MORTAR

A. Grout solid all hollow masonry to receive anchors or reinforcement.

3.11 REINFORCEMENT AND ANCHORAGE - CONCRETE MASONRY UNITS

A. Reinforce concrete masonry unit partitions as shown on Structural Drawings.
B. Unless otherwise shown on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
C. Lap joint reinforcement ends minimum 6 inches.

3.12 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
    1. Coordinate spacing of anchors with spacing of cold-formed metal framing at stud-framed back-up walls.
    2. Set anchors in sealant and seal all penetrations through the VR/AIB to make airtight. The Masonry Trade Contractor shall be responsible for confirming sealant is properly installed and that penetrations are airtight.
        a. Anchor sealing shall be included and reviewed in mock-up prior to installation..
C. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

3.13 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
    1. Extend flashings full width at such interruptions and at least 4 inches, minimum, into adjacent masonry or apply factory-formed end dams, to form watertight pan at juncture with non masonry construction.
    2. Interlock lapped ends applying sealant within locked joint and seal joins. Apply flashing to substrate using non-penetrating surface application with termination bar.
        a. Seal lapped ends, factory-formed corners, end dams, and penetrations of flashing before covering with mortar.
B. Extend fabric copper flashings to within 1/4 inch of exterior face of masonry. Set copper flashing in solid bed of lap sealant on top of stainless steel drip edge.
C. Lap end joints of flashings at least 4 inches, minimum, and seal watertight with full bed application of mastic or elastic sealant.
D. Install flashing with factory-hemmed edge projecting downward beyond face of masonry veneer below.
E. Install termination bars, cut off mastics, and other terminating products as recommended by the flashing manufacturer and as shown on the manufacturer's installation instructions.

3.14 LINTELS

A. Maintain minimum 8 inch bearing on each side of opening for precast concrete lintels, and 8 inch bearing on each side of opening for unit masonry or steel lintels.

B. Provide bond break and/or through wall flashing between precast concrete and other masonry veneer materials.

C. Where lintels cross control joints, wrap end of lintel isolated by joint with bond break material.

3.15 BRICK RELIEVING ANGLES

A. Provide through-wall flashing and drip edge at structural relieving angles.

1. Drip edge configuration shall fit lipped brick conditions as shown on drawings, utilizing preformed corners for drip edges.
2. Install flashing and drip edge per FLASHING paragraph above.
3. Install compressible sealant at top of brick below relieving angle, in thickness to fill gap while in moderate compression.
4. Position compressible filler within bed depth to allow installation of sealant at face of brick under drip edge. Sealant to be installed by Section 07 00 01.

3.16 MASONRY CONTROL JOINTS

A. Locate control joints where shown on drawings, and not more than 24 feet on center where not shown on drawings.

B. Do not continue horizontal joint reinforcement through control or expansion joints.

C. At CMU, form control joint 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.

3.17 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Grout masonry cores and hollow metal (HM) frames solid as shown on drawings, and per ASTM C476.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.18 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.19 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.20 PARGING

A. Dampen masonry walls prior to parging.

B. Apply liquid bonding agent or primer in accordance with manufacturer recommendations.

C. Apply liquid bonding agent or primer in accordance with manufacturer recommendations.

D. Install base coat(s) of parging or mortar material.

E. Install reinforcing materials appropriate to the repair area.

F. Scarify each parging coat to ensure full bond to subsequent coat.

G. Install finish coats to walls and/or decorative concrete elements. Trowel smooth flat surface and/or tool molded surfaces to blend into adjacent parging to remain.

3.21 FIELD QUALITY CONTROL

A. Inspection and testing of reinforced masonry work will be performed by an independent Testing Agency, under a separate contract with the Owner. Materials and workmanship shall be subjected to inspection and testing in shop and field by Architect and/or Testing Agency. Such inspection and testing shall not relieve the Masonry Trade Contractor of responsibility to provide additional inspection, testing, and quality control, to furnish materials and workmanship in accordance with requirements of Contract Documents.

B. Notify Architect and Testing Agency prior to start of any fabrication, erection, or other phases of work so as to afford them reasonable opportunity to visit the site. Such notification shall be made at least 36 hours in advance.

C. Field Tests:

1. Moisture Content: Sampling and testing of concrete masonry units for moisture content will be performed by Owner. Upon delivery of units to the project site and periodically thereafter, samples shall be selected at random from stockpiles and tested in accordance with ASTM C140/C140M. If the moisture content requirements in ASTM C90 are not met, additional protection for stockpiles will be provided immediately. If the moisture content is over five percent maximum, the units will be rejected for use until they are made to conform to the moisture content requirements.
2. Field Tests for Strength of Mortar and Grout: The strengths specified for grout and mortar will be verified during the progress of the work by testing samples taken at the job site as follows. Any changes to the mix or materials will require the testing of samples. All sampling shall be performed by the Owner's Testing Agent.
    a. Mortar: Each day take at least three specimens of mortar placed that day. Samples will be tested in accordance with the applicable portions of ASTM C780 and shall exhibit a minimum ultimate compressive strength of 2500 pounds per square inch.
    b. Grout: Take at least three specimens each day of grout placed that day. Samples will be tested in accordance with the applicable portions of ASTM C39/C39M and shall exhibit a minimum ultimate compressive strength of 3000 pounds per square inch.
3. Prism Tests: Make at least one prism test sample for each 5,000 square feet of wall but not less than three such samples for any building. Each sample shall consist of three prisms. Owner will perform the tests.
    a. Prisms shall be tested in accordance with ASTM C1314.
    b. Compressive strength shall be not less than 2000 pounds per square inch.

D. The cost of additional testing and inspection required because of changes in materials or proportions requested by the Masonry Trade Contractor shall be paid by the Trade Contractor.

3.22 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Remove excess parging.

C. Remove excess mortar and mortar droppings.

D. Replace defective mortar and nonconforming masonry. Match adjacent work.

E. Clean soiled surfaces with cleaning solution.

F. Vacuum interior exposed masonry surfaces to keep free of granules and dust.

G. Protect precast architectural concrete, cast stone masonry, and _____ during cleaning of brick veneer. Immediately remove stains and discoloring cleaning fluid residue from precast concrete.

H. Knock down surface imperfections and scrape smooth to provide a flat, level, smooth surface.

I. Use non-metallic tools in cleaning operations.

3.23 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities. Remove immediately prior to Substantial Completion.

END OF SECTION

SECTION 04 43 00
STONE SITE MASONRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section consists of providing all labor, equipment, materials, incidental Work and construction methods necessary to furnish and install designated Site Improvements and related items as indicated on the Drawings, as specified in this Section, and includes, but is not limited to, the following:
   1. Monolithic granite seatwalls.
   2. Granite landscaping edging.

B. Related Sections:
   1. Section 03 30 00.13 "CAST-IN-PLACE CONCRETE (SITE)" for installing concrete footings.
   2. Section 31 00 00 "EARTH MOVING" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
   3. Section 32 14 13 “UNIT PAVING ON BITUMEN” for stone and concrete paving units.

1.03 REFERENCES

A. The following Standards shall apply to the Work of this Section:
   1. Commonwealth of Massachusetts Department of Transportation (MassDOT) Highway Division Specifications: Standard Specifications for Highways and Bridges.
   2. National Concrete Masonry Association (NCMA): Specifications for the Design and Construction of Load Bearing Concrete Masonry.
   3. National Building Granite Quarries Association, Incorporated (NBGQA): Specifications for Architectural Granite.
   4. International Masonry Industry All-Weather Council: Recommended Practices for Cold Weather Masonry Construction.
   5. ACI: American Concrete Institute:
      Building Code Regulations for Masonry Structures and Specifications for Masonry Structures and Commentaries 530-99/530.1-99.
   6. ASTM: American Society for testing and Materials:
      Standard Specification for Steel Wire, Plain, for Concrete Reinforcement: A82-97a.
      Standard Specification for Zinc Coating (Hot-dip) on Iron: A153.
      Steel Hardware: A153M.
      Standard Specification for Stainless Steel Bars and Shapes: A276.
      Standard Specification for Making and Curing Concrete Test Specimens in the Field: C31/C31M.
      Standard Specification for Aggregate for Mortar Masonry: C144.
      Standard Specification for Portland Cement: C150.
      Standard Specification for Hydrated Lime for Masonry Purposes: C207.
      Standard Specification for Air-entraining Admixtures for Concrete: C260.
      Standard Specification for Mortar for Unit Masonry: C270.
      Standard Test Method for Linear Drying Shrinkage for Concrete Masonry Units: C426.
      Standard Test Method for Change in Height at Early Stages of Cylindrical Specimens from Cementitious Mixtures: C827.
      Test Methods for Absorption and Bulk Specific Gravity of Dimensional Stone: C97.

Test Methods for Modulus of Rupture of Dimension Stone: C99.
Standard Terminology Relating to Dimension Stone: C119.
Test Method for Compressive Strength on Dimension Stone: C170
Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic: C241.
Standard Specification for Granite Dimension Stone: C615.
Test Method for Flexural Strength of Dimension Stone: C880.

7. FS: Federal Specifications as indicated.

1.04 ACTION SUBMITTALS

A. Shop Drawings: Prior to ordering the below listed materials, submit Shop Drawings to the Owner's Representative for acceptance as follows:
   1. Provide Shop Drawings for monolithic seatwall, and landscape edge, showing details of stone pieces indicating cross sections, elevations showing layout of all pieces, sizes, dimensions, finishes, arrangement and provisions for joining, anchoring, cut-outs and holes, and other necessary details for reception of other Work.
      a. Shop Drawings shall indicate the setting number of each piece, and each piece shall bear the corresponding number in a non-staining paint on the back of the wall segments.
      b. Show interface with other adjacent and related work; coursing; special shapes; panel marks illustrating conformance to adjoining panels not being out of color range by more than half; any embedded or penetrating items; control joints; and details at openings.
      c. Submit shop drawings for mockups.

B. Manufacturer's Literature: Submit copies of each of the manufacturer's material descriptions and installation instructions for the following. Do not order materials until Owner Representative's acceptance has been obtained. Delivered materials shall closely match the accepted samples:
   1. Joint filling materials
   2. Non-Shrink grout
   3. Stainless Steel pins
   4. Anchors, ties, and accessories

C. Samples for Verification: Stone samples shall fully demonstrate color, shade, veining, texture, range, finish and dimension cut. Submit one complete sample two inches thick, full height and full width wall and step segment, and landscape edging with all stone finishes and mortar, for acceptance prior to fabrication.
   1. Monolithic Granite Seatwall – Color: TBD; Landscape Grade.
   2. Granite Landscape Edging – Color TBD; Landscape Grade.
   3. Mortar – Range to be Selected by Landscape Architect during Shop Submittals
   4. Polymeric Sand – Range to be Selected by Landscape Architect during Shop Submittals.
   5. Joint Caulk – Range to be Selected by Landscape Architect during Shop Submittals
   6. Self-Leveling Polyurethane Elastomeric Joint Sealant | Caulking - Range to be Selected by Landscape Architect during Shop Submittals

1.05 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, sources of supply, and other information to identify materials used. Include mix proportions for mortar and source of aggregates.
   1. Submittal is for information only. Neither receipt of list nor acceptance of mockups constitutes acceptance of deviations from the Drawings unless such deviations are specifically brought to the attention of Architect and accepted in writing.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose Work has resulted in successful site stone masonry installations.

1. Experience: Three years' experience in masonry installation of similar quality, schedule requirement and construction detailing.
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time foreman or crew leader on Project site when Work is in progress. Foreman shall have 10 years total masonry Work experience and at least five years' experience in installation of equivalent type and similar scope of this Project.

B. Qualification of fabricator: A firm experienced in fabricating stone units similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to manufacture required units.

C. Source Limitations for Stone: Obtain each variety of stone, from one source from a single quarry pit, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties.

D. Stone shall be standard grade, sound, uniform in quality, texture, and strength, and shall be free of flaws, reeds, rifts, laminations, cracks, seams, starts, or other defects which may impair its strength, durability, or appearance. Exposed surfaces shall be free from spots, spalls, chips, stains, discoloration, or other defects which would affect its appearance.

E. Color, texture, and finish shall be within the range of samples accepted by the Owner's Representative.

F. Source Limitations for Mortar and Joint Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate. Obtain Polymeric Joint Sand from one source with the resources to provide materials and products of consistent quality in appearance and physical properties.

G. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockup of typical wall area as shown on Drawings.
   2. Fabricate and build a completed eight-foot-long, full width sample of each type of wall as applicable and an eight-foot-long section of landscape edging. Samples shall include all aspects for each wall and edging, including typical base materials, concrete footing, drainage, mortar color, vertical expansion joint, ties, and all steel anchors for capstones. Accepted samples may be part of the finished Work upon acceptance by Client's Representative. Upon acceptance, samples shall be the standard of quality for walls by individual type. In the event the sample is not acceptable, the General Contractor shall immediately remove the unaccepted sample and submit a new, similarly dimensioned, constructed sample for acceptance. Repeat preparation of samples until acceptance by the Owner's Representative.
   3. Notify the Owner's Representative one week in advance of the dates and times when constructed samples will be erected.
   4. Protect constructed samples from the elements with a weather-resistant membrane for the duration of the Project.
   5. Accepted mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. Test Reports: Submit test results in accordance with the referenced ASTM specification:
   1. Compressive strength: ASTM C216.
   2. 24-hour cold water absorption: ASTM C216.
   3. Five-hour boil absorption: ASTM C216.
   4. Freezing and thawing (50 cycles): ASTM C216.
   5. Saturation coefficient: ASTM C216
   6. Initial rate of absorption (suction) ASTM C216

7. Efflorescence: ASTM C216.

I. Pre-Construction Walk: Conduct pre-construction site walk at the Project site at a day and time specified by the Owner's Representative.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Cut stone shall be carefully packed and banded by the supplier for shipment. Following shipping stones to the site, the stone shall be stored and protected from the weather and stacked in such a manner to prevent breakage, cracking, and damage to stone pieces, and to allow air to circulate around the stone material. Stone shall not be permitted to be in direct contact with the ground for any time during storage.

B. Cut stone damaged in any manner will be rejected and shall be replaced with new materials at no additional cost to the Owner.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp. Store Polymeric Joint Sand on elevated platforms, under a cover and/or in a dry location.

D. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

E. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

F. Store masonry accessories, including metal items, in their original containers marked with the product identification number and manufacturer, and under cover, away from direct contact with the ground, and in manner to prevent corrosion and accumulation of dirt and oil.

G. Damaged material: Remove all damaged and contaminated materials from the job site immediately, including materials in broken packages and packages bearing water marks or other evidence of damage, unless Owner's Representative specifically authorizes correction and use on this Project.

1.08 PROJECT CONDITIONS

A. Protection of Stone Site Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's Work. Cover partially completed stone masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone masonry.
   1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40-degree Fahrenheit and above and shall remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

E. Weather Limitations for Polymeric Jointing Sand:
   1. Install Polymeric Joint Sand only when ambient temperature is above 40 degrees Fahrenheit (five degrees Celsius), under dry conditions with no rain forecast for 24 hours and when surface of pavement is completely dry.

1.09 COORDINATION

A. Coordinate Work with that of other Section affected by this Work to assure the steady progress of the Work under the Contract.

1.10 WARRANTY

A. All stone masonry parts shall be guaranteed against workmanship and material defects for one year from time of delivery, or as noted herein.

PART 2 PRODUCTS

2.01 STONE SUPPLIERS

A. Source: Subject to compliance requirements, provide stone from sources as follows, or approved equal:
   1. Structural Stone, LLC/Fletcher Granite Co., 285 Smith Street, North Kingston, RI 02852; Telephone: 401.667.4969; Fax: 401.667.5969; Local Representative: Jamie Crothers; Cell: 774.454.3670; E-mail: Jamie@StructuralStoneLLC.com; Website: www.StructuralStoneLLC.com.
   2. Freshwater Stone, P.O. Box 15; 4 Upper Falls Road, Orland, ME 04472; Telephone: 207.469.6331; Fax: 207.469.7057; E-mail: info@freshwaterstone.com; Website: www.freshwaterstone.com.
   3. J.C. Stone, Inc., 539 Rockland Road (Route 17), Jefferson, ME 04348; Telephone: 207.549.4729; Fax: 207.549.4032; E-mail: sales@jcstoneinc.com; Website: www.jcstoneinc.com.
   4. Swenson Granite Works, 10 Main Street, Route 9, Medway, MA 02053; Telephone: 508. 533.2882, Fax: 508.533.3441; Website: www.swensongranite.com.
   5. Stone Curators, 76 State Street, Suite 202, Newburyport, MA 01950; E-mail: info@stonecurators.com; Website: www.stonecurators.com.

B. Any manufacturer's names and/or stone types identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is not a proprietary specification, and it should be noted that "or equivalent" applies to all products denoted herein. It is understood that all manufacturers will have minor variations in configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an equivalent. It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that can supply similar products.

C. Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: see Section 01 25 00 "SUBSTITUTION PROCEDURES".

2.02 BASE MATERIAL

A. Processed gravel as specified in Section 31 00 00 "EARTH MOVING" of this Specification, and as shown on the Drawings.

2.03 FOUNDATION

A. Reinforced concrete footing and reinforcement shall be as specified in Section 03 30 00.13 "CAST-IN-PLACE CONCRETE (SITE)", and as shown on the Drawings.

2.04 GRANITE

A. Stone shall be standard grade, sound, uniform in quality, texture, and strength, and shall be free of flaws, reeds, rifts, laminations, cracks, seams, starts, or other defects which may impair its strength, durability, or appearance. Exposed surfaces shall be free from spots, spalls, chips, stains, discoloration, or other defects which would affect its appearance.

A. Description:
   1. Caledonia; Landscape Grade – uniform color variation of dark and light grey and pink tones with black flecking.

2. Deer Isle - Gray; Landscape Grade – medium to coarse grained with predominately gray color with subtle light pink and lavender hues and black mica flecks.
3. Autumn Brown; Landscape Grade – medium to dark brown coarse grained with flecks of black, white, grey, reddish and golden.
4. Chelmsford Grey; Landscape Grade – light colored medium-grained granite that is predominantly gray in color with subtle black flecks.
5. Chelmsford White; Landscape Grade – light colored medium-grained granite that is predominantly a white and gray color.
6. Jet Mist; Landscape Grade – uniform deep charcoal to black granite that has subtle variations and occasional light flecks.
7. Concord Gray; Landscape Grade – uniform color variation of dark and light grey with black flecking.

B. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
C. Use one source for each type of granite throughout the entire Project for seatwalls, and landscape edging.
D. Granite Properties: Unless otherwise indicated granite as supplied shall meet or exceed the following:
   1. Bulk Density (ASTM C97): 182.6 pounds per cubic foot, average.
   2. Absorption (ASTM C97): 0.12 percent, average.
   3. Compressive Strength (ASTM C170): 29,000 pounds per square inch, average.
   4. Modulus of Rupture (ASTM C99): 2,385 pounds per square inch, average.
E. Cut and Finish: Granite for each application shall be cut and finished as follows:
   1. NAME Granite; Monolithic Seatwall
      a. Quantity, Finish and Size Requirements: One monolithic piece – combination Thermal exposed faces, Sawn joints and bottom, and Thermal, Honed or Polished top finishes, one inch Radius Bullnose between Honed Top and Thermal Faces as represented by the samples submitted to the Landscape Architect on XX MONTH YEAR, and as shown on the Drawings. Curved sections shall have radially cut ends.
   2. NAME Granite; Landscape Edging
      a. Quantity, Finish and Size Requirements: Thermal and sawn finishes as shown on the Drawings. Curved sections shall have radially cut ends.
F. Granite Fines: Supply granite fines from production of stone pieces for finishing joints. Provide one five-pound bag of stone fines per every 50 linear feet of wall.
G. Granite Fabrication:
   1. Size and Dimension: Granite shall be of the sizes and dimensions indicated on the Drawings and accepted Shop Drawings.
   2. Back of granite which will be concealed in the finished Work shall be sawn to approximately true planes. Maximum variation in thickness shall be 3/8 inch. Sawn backs shall be cleaned or rust stains and iron particles.
   3. All faces shall be at right angles to the plane of the top.
   4. Granite shall be cut accurately to required shapes and dimensions.
   5. Holes and cut-outs in the granite Work for anchors, dowels, skateboard deterrents, and lifting devices, shall be accurately cut or drilled to required dimensions, as shown on the accepted Shop Drawings to secure granite in place to insure correct location and accurate lift of all fixtures.
   6. Arrises shall be cut sharp and true to square, and continuous with joining arrises. Where exposed, arrises shall be eased as shown on the Drawings and accepted Shop Drawings.

2.05 GENERAL FABRICATION

A. Flatness Tolerance: Variation from true pane, or flat surfaces, shall be determined by use of a four-foot-long straightedge, applied in any direction on the surface. Such variations on polished, honed, and fine rubbed surfaces at the bed and joint arriss lines shall not exceed 3/64 inch or 1/16 of the specified joint width, whichever is greater. On surfaces having other finishes the maximum variation from true plane shall not exceed 1/4 of the specified joint width.

B. Variations from true plane on other parts of face surfaces shall not exceed the following:
   1. Polished, hones or fine rubbed finishes: 3/64 inch
   2. Rubbed or fine stippled sandblasted finishes: 1/16 inch
   3. Shot ground, eight-cut and six-cut finishes: 3/32 inch
   4. Four-cut and sawn finishes: 1/8 inch
   5. Thermal, antique and coarse stippled sandblasted finishes: 3/16 inch

2.06 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction as selected by Owner's Representative and shall exhibit no efflorescence when cast into two inches by seven inch by 1/2-inch slabs comprising the mortar under test. Provide natural color or white cement to produce mortar color indicated.

B. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.Hydrated Lime: provide plastic hydrate, conforming to ASTM C 207, Type S as accepted by the Owner's Representative.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207.

D. Sand: clean, washed, uniformly well-graded, conforming to ASTM C144 with 100-percent passing No. 8 sieve, and not more than 35 percent passing No. 50 sieve, with a fineness modulus maintained at 2.25 plus or minus 0.10.
   1. Mortar Aggregates: Natural, colored sand or ground granite as selected by Landscape Architect.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in stone masonry mortar.

F. Latex Additive: latex polymer additive shall be mixed with cementitious materials and aggregate in lieu of water, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

G. Cold-Weather Admixture: Anti-freeze admixtures and accelerators shall not be used in mortar.

H. Water: clean, fresh, potable.

2.07 MASONRY ANCHORS

A. Pins shall be stainless steel bar stock conforming to the requirements of ASM A276-98B Type 304, sized as shown in the Drawings.

2.08 GROUT

A. Grout shall be Latex-portland cement grout consisting of graded silica sand, colorfast pigments, latex modifiers, organic and inorganic chemicals.
   1. Product: shall be MP Sanded 924 – Latex-portland cement grout. Grout shall conform to ANSI A118.6-H2.4, A108.1, A108.4, A108.7 and A108.10.
   2. Manufacturer: C-Cure Incorporated, 13001 Seal Beach Boulevard, Seal Beach, CA 90740, Telephone 800.895.2874 or approved equal.
   3. Color: to be selected by Landscape Architect.

2.09 JOINTS

A. Primer: Provide primer recommended by sealant manufacturer for surfaces to be adhered to.

B. Bond Breaker Tape: Provide polyethylene or other plastic tape recommended by sealant manufacturer for compatibility with sealant. 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.

C. Joint backing for general use at joints in horizontal surfaces shall consist of two rows of butyl rubber or neoprene foal rod in contact with one another and compressed to approximately 2/3 original width when in place.

D. 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.

2.10 POLYMERIC JOINT SAND

A. Provide Polymeric Joint Sand as manufactured by:
   1. Alliance Gator G2
      a. Product Type: Dry mix, contains polymeric binding agent, activated with water.
      b. Color: Slate Grey, or Ivory.
   2. Unicare HP Polymeric Max Sand
      a. Product Type: Dry mix, contains polymeric binding agent, activated with water.
      b. Color: Grey, or custom.
   3. Techniseal HP Next Gel
      a. Product Type: Dry mix, contains polymeric binding agent, activated with water.
      b. Color: Grey, or custom.

B. Provide Polymeric Joint Sand meeting the minimum material and physical properties as follows:
   1. Compression Strength: proven resistance to compression of 550 pounds per square inch after drying for seven days under controlled conditions (73degrees Fahrenheit (23 degrees Celsius) at 50 percent humidity).
      a. Test sand sample shape: cylinder (two-inch (five centimeters) diameters by four inches (10 centimeters) high).

2.11 SELF-LEVELING POLYURETHANE ELASTROMERIC JOINT SEALANT | CAULKING

A. Provide two or more part, self-leveling, polyurethane based elastomeric sealant, complying with ASTM C920, Type 1 Class A, having Shore A hardness of not less than 30 when tested according to ASTM C920, cured modulus of elasticity at 50 percent elongation of not more than 150 pound per square inch, when tested according to ASTM D412, and tear resistance of not less than 50 pounds per inch when tested according to ASTM D624.

B. Where join surfaces contain bituminous materials, provide modified sealants which are compatible with bituminous materials encountered.

C. Provide one of the following products that meet or exceed specified requirements:
   1. Pecora Urexpan NR-200.
   2. Mameco Vulkem 245 or 255.
   3. Sika Sikaflex 1a.
   4. Sonneborn Sonolastic PvJtSt.
   5. Tremco THC 900.

D. Extent: Provide self-leveling polyurethane sealant | caulking for stone wall joints.

2.12 DRAINAGE

A. Pipe: Provide PVC, schedule 40, as specified in Section 31 00 00 "EARTH MOVING", and in sizes shown on the Drawings.

B. Filter Fabric: Provide “Mirafi 140N” as manufactured by TenCate Geosynthetics Americas, Pendergrass, Georgia, 30567, Telephone 706.693.2226, or approved equal.

C. Drainage material shall be Crushed Stone for Drainage as specified in Section 31 00 00 "EARTH MOVING".

2.13 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer’s standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

B. Installation Contractor shall assemble stone walls according to the Drawings and accepted Shop Drawings.

3.03 SETTING OF STONE MASONRY, GENERAL

A. Comply with ACI 530/530.1 for unit masonry standards applicable to each type of installation included in the Project.

B. Erect all masonry Work in compliance with line and level tolerances specified in this Section. Correct or replace, non-conforming masonry Work at no additional cost to the Owner.

C. Lay no exposed unit having chipped edges and face defects. Remove any such unit, if installed, and replace with an undamaged unit at no additional cost to the Owner.

D. Examine all Drawings as to requirements for the accommodation of Work of other trades and Installation Contractors. Take every precaution to minimize cutting and patching. Deliver inserts and other anchorage items required to be cast in concrete in sufficient time to prevent any delay in such Work. Closely coordinate the location and placement of such items.

E. Protect all masonry from rain prior to, and during installation thereof. If ambient temperature is in excess of 80 degrees Fahrenheit at time of installation, lightly moisten contact surfaces of masonry units by brushing with water.

F. Perform necessary field cutting and trimming as stone is set.

1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
2. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.
3. Pitch face at field-split edges to match stones that are not field split.

G. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication or that is otherwise unsuitable for intended use.

H. Provide protection against breakage and weather damage to all masonry Work, including coverings over the tops of walls and wherever necessary to protect Work at all stages of

completion. Protect masonry at all times when masons are not working the walls. Apply tarpaulins or waterproof paper properly weighted or nailed to assure their remaining in place to protect masonry.

I. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

3.04 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet in line of walls.

B. Variation from Level: For surfaces, do not exceed 1/4 inch in 10 feet in any direction when tested with 10-foot straightedge.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.

D. Unit-to-unit tolerance: 1/8 inch.

E. Measure variation from level, plumb, and position shown in plan as variation of the average plane of the face of each stone from level, plumb, or dimensioned plane.

F. Variation in Mortar-Caulk Joint Thickness: Do not vary from joint size range indicated.

G. Variation in Plane between Adjacent Stones: 1/8 inch.

3.05 MORTAR PROPORTIONING AND MIXING

A. Except as otherwise specified in this Section, confirm the property and proportion requirements of ASTM C270 for all mortar.

B. Measurements: Proportions shall be by volume. One bag of Portland cement (94 pounds) shall be considered as one cubic foot; one bag of lime (50 pounds) as 1-1/4 cubic feet; and sand shall be measured in dry conditions (90 pounds) being equal to one cubic foot.

C. Mixing: Mortars shall be machine-mixed in an approved type mixer in which the quantity of water can be accurately and uniformly controlled. Where hydrated limes are used for mortars requiring a lime content, the materials for each batch shall be well-raked and turned over together before water is added until the even color of the mixed materials indicates that the cement materials have been thoroughly distributed throughout the mass, after which water shall be gradually added until a thoroughly mixed mortar of required plasticity is obtained. The same mortar mixture shall be used for all similar Work.

D. The color of the mortar shall be strictly controlled to assure the uniformity of color throughout the Work.

E. The method of measuring materials shall be such that the specified proportions of the materials can be controlled and accurately maintained. Shovel measurement shall not be allowed.

F. All cement materials and aggregates shall be mixed at least three minutes in the mixer with the minimum amount of water required to produce a workable consistency. Hand mixing shall not be used unless specifically accepted.

G. Mortar that has begun to set or which is not used within 2 1/2 hours after initial mixing shall be discarded. Mortar that has stiffened due to evaporation with the 2 1/2-hour period shall be re-tempered to restore its workability. Re-tempering mortar that has partially hardened without additional cement aggregate or water shall not be permitted.

3.06 BASE AND FOUNDATION

A. Place processed gravel base as specified in Section 31 00 00 "EARTH MOVING", and as shown on the Drawings.

B. Build reinforced concrete foundation as specified in Section 03 30 10.13 “CAST-IN-PLACE CONCRETE (SITE)” and as shown on the Drawings and accepted Shop Drawings. Walls shall have a smooth form finish on all surfaces.

C. Build in reinforcement and drainage as the Work progresses.

3.07 STONEWORK

A. General
   1. Clean stone slab before setting by scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh fillers or abrasives.
   2. Lay new masonry on a smooth bed of mortar after concrete foundation has been cleaned.
   3. Set stone in accordance with Drawings and final Shop Drawings. Provide anchors, supports, fasteners, and other attachments shown, specified or necessary to secure stonework in place in accordance with the best practices of the trade. Shim and adjust accessories for proper stone setting. Completely fill holes, slots, and other sinkages for anchors, dowels, fasteners, and supports with non-shrinking, non-staining mortar during setting of stones.
   4. Do not realign, tap, or in any way move stone after initial placement and after 2.5 hours have elapsed since initial mortar mixing.
   5. Dress joints (bed and vertical) straight and at a 90-degree angle to face unless otherwise shown or required.
   6. Joint widths: Cut stonework to provide uniform joint widths as shown. Cut stonework to allow for uniform 3/8-inch-wide joints, unless otherwise shown.
   7. Rake out joints before mortar sets to allow for joint finishing. Clean face of stone after raking.
   8. Do not allow any petroleum-based fillers or sealants to come in contact with stonework.

3.08 JOINT PREPARATION

A. Strictly comply with Manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section.

B. Clean joint surfaces immediately before installation of sealants, primers, tapes and fillers. Remove substances which could interfere with bond. Surfaces which have been given protective coatings and those that contain oil and grease shall be thoroughly cleaned with xylol or MEK solvent, with due precautions taken to minimize hazards.

C. Unless otherwise indicated, the use of sealants shall conform to ASTM C1193.

D. Tape or mask adjoining surfaces to prevent spillage and migrations problems.

E. Prime surfaces as recommended by sealant manufacturer.

3.09 JOINT INSTALLATION

A. Provide backer rods for joint sealants except where specifically recommended against by sealant manufacturers.

B. Prevent three-sided adhesion by use of bond breaker tapes or backer rods.

C. 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.

D. Except in hot weather, make sealant surface slightly concave. Install sealant so that compresses 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.

E. Provide sealants to depths indicated, or if not indicated, follow manufacturer's recommendations.

F. All joints shall be finished with granite dust shavings as supplied by granite manufacture and as matches granite used in the walls.

3.10 POLYMERIC JOINT SAND

A. Polymeric Joint Sand
   1. Install Polymeric Joint Sand per manufacturers recommended instructions.

3.11 FIELD QUALITY CONTROL

A. Testing Frequency: Tests and evaluations listed in this Section shall be performed during construction for each 5,000 square feet of wall area or portion thereof.
   1. Mortar properties shall be tested per property specification of ASTM C270.
   2. Mortar composition and properties shall be evaluated per ASTM C780.

B. Evaluation of Quality Control Test: In absence at other indications of noncompliance with requirements, masonry shall be considered satisfactory if results from construction quality control tests comply with minimum requirements indicated.

3.12 ADJUSTING AND CLEANING

A. Remove and replace stone masonry of the following description:
   1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are accepted by Owner's Representative.
   2. Defective joints.
   3. Stone masonry not matching accepted samples and mockups.
   4. Stone masonry not complying with other requirements indicated.

B. Replace in a manner that result in stone masonry matching accepted samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stone masonry clean at all times and protected against damage as Work progresses. As each segment of the new masonry is erected, dry-brush the surfaces free of mortar spots and droppings. Remove mortar fins and smears before tooling joints.

D. Prior to final cleaning Work, examine all face joints in new exposed masonry to locate cracks, holes or other defects and point up all such defects and fill with mortar as specified herein. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement. When necessary, in the opinion of the Owner's representative, cut out defective joints in masonry, and replace with new materials, exercising extreme care to match original Work.

E. Provide polyethylene coverings or other temporary protection accepted by the Owner's representative for all lawn, planting and other non-working areas or improvements adjacent to masonry cleaning zone. Plant beds shall be protected from foot traffic and the associated soil compaction by the placement of planking whenever foot traffic is anticipated. Remove protective coverings from lawn and planting areas immediately following completion of cleaning operations.

F. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on mockup; leave one-half of panel un-cleaned for comparison purposes. Obtain Owner's Representative's acceptance of sample cleaning before cleaning stone masonry.
   3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
   5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.
   6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.

G. Final cleaning Work shall be performed only when atmospheric temperature is above 40 degrees Fahrenheit and rising.

H. Use of wire brushes or other abrasive tools for cleaning shall not be permitted.

I. 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.

3.13 EXCESS MATERIALS AND WASTE

A. Excess Stone: Stack excess stone where directed by Owner's Representative for Owner's use.

B. Disposal as Fill Material: Dispose of clean masonry waste; including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than four inches in greatest dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste.
3. Do not dispose of masonry waste as fill within 18-inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

D. Remove from the site and legally dispose of all cartons and debris resulting from Work under this Section not less often than once per week.

END OF SECTION

SECTION 04 43 13
STONE MASONRY PANEL WALL SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section consists of providing all labor, equipment, materials, incidental Work and construction methods necessary to furnish and install designated Site Improvements and related items as indicated on the Drawings, as specified in this Section, and includes, but is not limited to, the following:
   1. Pre-engineered Stone Masonry Panel wall system as detailed on Drawings and meeting requirements of these Specifications.
   2. Structural design, fabrication, delivery and handling, and installation of wall system.
   3. Aggregate base course, geotextile fabric, and drainage for wall system.

B. Related Sections:
   1. Section 31 00 00 "EARTH MOVING" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
   2. Section 03 30 00.13 "CAST-IN-PLACE CONCRETE (SITE)" for cast-in-place footings.

1.03 REFERENCES

A. Commonwealth of Massachusetts Department of Transportation (MassDOT) Highway Division Specifications: Standard Specifications for Highways and Bridges.

B. National Concrete Masonry Association (NCMA): Specifications for the Design and Construction of Load Bearing Concrete Masonry.

C. International Masonry Industry All-Weather Council: Recommended Practices for Cold Weather Masonry Construction.

D. ACI: American Concrete Institute:
   Building Code Regulations for Masonry Structures and Specifications for Masonry Structures and Commentaries 530-99/530.1-99.

1.04 ACTION SUBMITTALS

A. Refer to Section 01 30 00 “ADMINISTRATIVE REQUIREMENTS” for submittal definitions, requirements, and procedures. The following paragraphs supplement the requirements of Section 01 30 00.

B. Samples: Submit two sets of stone samples to Landscape Architect for review as soon as possible after award of contract, representing sizes and shapes to be used on Project. Include in each set full range of color, finish, and texture to be expected in completed work. Retain samples during construction as standard for completed stone wall system work.

C. Product Data: Submit specifications and other data for each type of stonework required, including certification that each type complies with specified requirements. Include instructions for handling, storage, installation and protection of each type.

D. Shop Drawings: Submit large scale Shop Drawings for fabrication and erection of all parts of the stone mason panel wall system. Provide plans, elevations, and details of anchorage, connections, lifting devices, and accessory items. Provide installation templates for work installed by other trades. Provide information on installation sequence with plans coded to numbered wall system units. Provide shop drawings stamped and sealed by a professional engineer registered in the Commonwealth of Massachusetts. Stone panel wall system fabricator shall be responsible for the design of any and all lifting devices and supports for handling members and to permit wall units to be handled and installed at the project site; full

details of lifting devices and supports shall be included as part of the shop drawings submitted for review.

1. Installation Drawings: Provide detailed drawings, properly checked and coordinated with existing conditions showing stone panel wall system design including supports, anchors, connections and attachments. For items installed in work by others, include setting diagrams, templates, and instructions. Installation drawings may be incorporated into Shop Drawings.
2. Show location of all recessed wall lights, weep holes and similar items in wall panel system.
3. Show interface with other adjacent and related work; coursing; special shapes; panel marks illustrating conformance to adjoining panels not being out of color range by more than half; any embedded or penetrating items; control joints; and details at openings.
4. Submit shop drawings for mockups.

E. Calculations: Provide professionally prepared calculations and certification of the performance of the work. Show how design load requirements and other performance criteria including all lifting devices and supports used for handling and installing the stone panel wall units have been met. Provide calculations stamped and sealed by a professional engineer registered in the State of Massachusetts.

F. Base of Wall System and Drainage: Submit for acceptance manufacturer's product data and representative samples of geotextile, and crushed stone material for review and acceptance of Landscape Architect.

1.05 QUALITY ASSURANCE

A. Engineering and Design: Provide the services of a Professional Engineer, registered as a Structural Engineer 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 wall system and connection design and safety, including miscellaneous supporting steel framework and all lifting devices and supports used for handling and installation. Design decisions and modifications that affect visual characteristics shall be subject to acceptance by Landscape Architect.

1. Show all connections and attachments for stone panel wall system members to receive work of other Sections.

B. Final acceptance of each member will be subject to acceptance by the Landscape Architect as based upon full conformance with these Specifications. Members shall be made accessible and fully visible to the Landscape Architect for observation at the fabricator's plant prior to shipment and/or at the site after shipment. Rejected members shall be immediately removed from the site and plant storage areas.

C. Installer Qualifications: A qualified landscape installer whose Work has resulted in successful site stone masonry installations.

1. Experience: Three years' experience in masonry installation of similar quality, schedule requirement and construction detailing.
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time foreman or crew leader on Project site when Work is in progress. Foreman shall have ten years total masonry Work experience and at least five years' experience in installation of equivalent type and similar scope of this Project.
3. The work of this Section shall be performed by Subcontractors who are regularly engaged in the engineering, manufacture, fabrication, finishing, and installation of similar stone wall system work and shall be licensed by the system manufacturer. Each subcontractor shall demonstrate to the Landscape Architect that they have successfully performed on comparable projects and can provide references for each.

D. Qualification of Fabricator: A firm experienced in fabricating stone units similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to manufacture required units.

E. Basis of System Design: Unless otherwise directed the completed wall system shall be:
   1. Stone face shall be free of visible horizontal or vertical joints.
   2. Stones used shall be full bed depth (four inches to eight inches thick).
   3. At least every third stone on top face of stone wall shall be full thickness wall.
   4. Joint between stones shall be raked back to a minimum depth of one inch to 1 1/2-inches.
   5. Backing of system for stone face and top shall be a monolithic concrete backing with minimum 28-day compressive strength of 4,500 pounds-per-square inch and 7.5 percent air entrainment.

F. Source Limitations for Stone: Obtain each variety of stone, from one source from a single quarry pit, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties.

G. Stone shall be standard grade, sound, uniform in quality, texture, and strength, and shall be free of flaws, reeds, rifts, laminations, cracks, seams, starts, or other defects which may impair its strength, durability, or appearance. Exposed surfaces shall be free from spots, spalls, chips, stains, discoloration, or other defects which would affect its appearance.

H. Color, texture and finish shall be within the range of samples acceptance by the Owner's Representative.

I. Pre-Construction Walk: Conduct pre-construction site walk at the Project site at a day and time specified by the Owner's Representative.

1.06 MOCK-UPS

A. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Fabricate and build a mockup per the accepted Mockup Shop Drawing. Samples shall include all aspects for stone wall unit, including typical base materials, stone and concrete wall unit, drainage, and vertical expansion joint. Accepted samples may be part of the finished Work upon acceptance by Client's Representative. Upon acceptance, samples shall be the standard of quality for landscape edging. In the event the sample is not accepted, the General Contractor shall immediately remove the unaccepted sample and submit a new, similarly dimensioned, constructed sample for acceptance. Repeat preparation of samples until acceptance by the Owner's Representative.
   2. Notify the Landscape Architect one week in advance of the dates and times when constructed samples will be erected.
   3. Protect constructed samples from the elements with a weather-resistant membrane for the duration of the Project.
   4. Accepted mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Stone shall be carefully packed and banded by the supplier for shipment. Following shipping stones to the site, the stone shall be stored and protected from the weather and stacked in such a manner to prevent breakage, cracking and damage to stone pieces, and to allow air to circulate around the stone material. Stone shall not be permitted to be in direct contact with the ground for any time during storage.

B. Stone damaged in any manner will be rejected and shall be replaced with new materials at no additional cost to the Owner.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.
E. Store masonry accessories, including metal items, in their original containers marked with the product identification number and manufacturer, and under cover, away from direct contact with the ground, and in manner to prevent corrosion and accumulation of dirt and oil.
F. Damaged material: Remove all damaged and contaminated materials from the job site immediately, including materials in broken packages and packages bearing water marks or other evidence of damage, unless Owner's Representative specifically authorizes correction and use on this Project.

1.08 PROJECT CONDITIONS

A. Protection of Stone Masonry: Cover partially completed stone masonry when construction is not in progress.
   1. Protect partially completed natural stone wall system work against weather when work is not in progress. Cover stonework with strong waterproof, non-staining membrane extending at least two feet down both sides of stonework. Anchor or fasten securely in place.
   2. Each day, just before stopping work, cover unfinished stonework with waterproof canvas, tarpaulin or reinforced, non-staining, waterproof paper secured in place and weighted down; turn down not less than 18 inches on each side.
B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions.
   1. No stone wall panel system installation shall be performed when temperatures is 35 degrees Fahrenheit and dropping, nor shall any work be done on rising temperature until the temperature reaches 32-degrees Fahrenheit unless properly heated enclosures are provided on both sides and over the top of such stonework.
   2. Do not use frozen materials or materials mixed or coated with ice or frost. Do not use salt to thaw ice in anchor holes or slots. Do not lower freezing point of mortar by using admixtures or antifreeze agents, and do not use calcium chloride in mortar or grout

1.09 COORDINATION

A. Coordinate Work with that of other Section affected by this Work to assure the steady progress of the Work under the Contract.
B. Do all cutting and drilling to accommodate Work of other Sections, including but not limited to holes for electrical conduits and anchor bolts for lighting attachment, as expressly indicated in Drawings, for the proper completion of the Work.

1.10 WARRANTY

A. Manufacturers shall provide their standard guaranties for work specified in this Section. However, such guaranties shall be in addition to and not in lieu of all other liabilities which manufacturers and General Contractor may have by law or by other provisions of the Contract Documents.
B. All stone masonry parts shall be guaranteed against workmanship and material defects for One year from time of delivery, or as noted herein.

PART 2 PRODUCTS

2.01 NATURAL STONE WALL SYSTEM

A. Provide the following system fully engineered, designed, and full installation and shop drawings of the stone panel system.
B. Source: Subject to compliance requirements, provide stone from sources as follows, or approved equal:

1. Natural Stone Wall Solutions, 2352 Main Street; Suite 103, Concord, MA 01742; Telephone: 978.461.1777; Website: www.naturalstonewallsolutions.com.

C. Basis of Design Style:
   1. Stone Pattern: New England Fieldstone (Round) Wall; Self-Capping
      a. New England Fieldstone – uniform color variation of dark and light earth tones without sharp edges or projections that could cause injury to users.
      b. Stone shall be standard grade, sound, uniform in quality, texture, and strength, and shall be free of flaws, reeds, rifts, laminations, cracks, seams, starts, or other defects which may impair its strength, durability, or appearance. Exposed surfaces shall be free from spots, spalls, chips, stains, discoloration, or other defects which would affect its appearance.
      c. Use one source of Fieldstone throughout the entire Project.
   2. System installed shall have mortarless appearance with joints raked back.
   3. Final Style to be as selected by the Landscape Architect.
   4. The Landscape Architect may require that the fabricator/supplier furnish a full range mock-up panel of up to three different stone types/styles as described in Paragraph 1.4D.
   5. See Section 04 43 00 “STONE SITE MASONRY” for stone wall cap specifications.

D. Any manufacturer's names and/or stone types identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is not a proprietary specification, and it should be noted that "or equivalent" applies to all products denoted herein. It is understood that all manufacturers will have minor variations in configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an equivalent. It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that can supply similar products.

E. Other manufacturer’s products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: see Section 01 25 00 “SUBSTITUTION PROCEDURES”.

2.02 GEOTEXTILE FABRIC

A. Geotextile fabric shall be Mirafi Tencate 140N Filter Fabric manufactured by Tencate; or approved equal.

2.03 CRUSHED STONE

A. Processed gravel as specified in Section 31 00 00 "EARTH MOVING” of this Specification, and as shown on the Drawings.

PART 3 EXECUTION

3.01 ACCEPTABILITY OF SUBGRADE

A. General Contractor shall examine the existing subgrade to determine its adequacy to receive natural stone wall system work. Evidence of inadequate subgrade shall be brought to the immediate attention of the Landscape Architect.

B. Start of work of this Section shall constitute acceptance of the subgrade.

3.02 GENERAL

A. All stone masonry panel wall system footings shall be installed per accepted natural stone wall Shop Drawings.

B. Excavation for installation of aggregate base and drains shall be performed so as not to undermine footings. Provide 12-inch minimum width of drainage material.

C. As soon as the excavation is completed to the grade of the bottom of the trench, the Installation Contractor shall line the trench with filter fabric. The Installation Contractor shall place a minimum of 18 inches of crushed stone in trench and compact the base firmly. The crushed stone shall be wrapped in filter fabric.

D. All areas of fill shall be placed and compacted according to Section 31 00 00 "EARTH MOVING. Once crushed stone fill has reached the top of trench, the remaining drainage fabric shall be folded toward centerline trench. Drainage fabric shall overlap a minimum of 12 inches completely encasing the stone.

E. Test foundation drainage system for proper drainage and flow. Clear or repair any areas of piping not constructed to accurate lines and grades. Clear any obstructions to drainage flow.

3.03 NATURAL STONE WALL INSTALLATION

A. Natural stone wall system shall be installed per accepted shop drawings and details and manufacturer's printed technical specifications.

3.04 PERFORMANCE REQUIREMENTS

A. Conduct inspections, perform testing, and make repairs or replace unsatisfactory natural stone wall system units.

B. In addition to above, in-place stone panel wall system units may be rejected for any one of the following reasons:
   1. Exceeding the specified installation tolerances.
   2. Irreparable damage during construction operations.
   3. Exposed to view surfaces which develop surface finish deficiencies.
   4. Non-compliance with acceptance criteria listed below.

3.05 GENERAL ACCEPTANCE CRITERIA

A. Natural stone wall system shall meet specifications. No structural deficiencies, cracks, loose inserts or anchors, exposed steel, steel with less than one-inch minimum cover, or other defects shall be permitted.

B. Appearance Acceptance Criteria: When viewed in natural daylight, exposed surfaces shall be uniform in color, texture, and finish shall be within the range of accepted mock-up samples when compared side by side.

C. Natural stone wall system units shall be reviewed for compliance with specifications in three stages as follows:
   1. Units will be reviewed at fabrication plant.
   2. Units will be reviewed after delivery to site.
   3. Units will be reviewed after installation and final cleaning.

D. Repair or replace natural stone wall system units according to the Landscape Architect.

3.06 CLEANING

A. After stone panel wall work shall be carefully cleaned, removing all dirt, stains, and other defacements.
   1. Mild abrasive cleaners that contain no harsh or caustic ingredients may be used, with fiber brooms or brushes and clear water. Wire brushes, steel wool, and acids or other solutions which may cause discoloration are expressly prohibited.

B. Upon completion of natural stone wall work, surfaces shall be left in a clean, unsoiled condition, accepted by the Landscape Architect.

3.07 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the requirements of Section 01 74 19, “CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL” for removal and disposal of construction debris and waste.

END OF SECTION

SECTION 04 72 00
CAST STONE MASONRY

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Masonry Trade Bid. See Section 04 00 01 - Masonry Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Furnish all labor, materials and installation of cast stone masonry systems as indicated on the drawings and/or as specified herein.

B. Architectural synthetic stone units.

1. Units required are:
    a. Exterior wall units, including panels.
    b. Reinforcement and anchorage.
    c. Mortar, grout, and flashings as specified in Section 04 20 00 - Unit Masonry.
    d. Caulk for cast stone panels as specified in Section 07 92 00 - Joint Sealants.
    e. Accessories required for a complete installation.

1.03 PRICE AND PAYMENT PROCEDURES

A. Alternates: See Section 01 23 00 - Alternates, for project alternates affecting this section.

1.04 ABBREVIATIONS AND ACRONYMS

A. ACI. American Concrete Institute; www.concrete.org.

B. ASTM. ASTM International; www.astm.org.

1.05 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.

F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

G. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

H. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.

I. ASTM C73 - Standard Specification for Calcium Silicate Brick (Sand-Lime Brick).

J. ASTM C150/C150M - Standard Specification for Portland Cement.

K. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

L. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.

M. ASTM C568/C568M - Standard Specification for Limestone Dimension Stone.

N. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.

O. ASTM C1364 - Standard Specification for Architectural Cast Stone.

P. Cast Stone Institute Technical Manual - Inspection and Acceptance.

1.06 ADMINISTRATIVE REQUIREMENTS

A. See Section 01 30 00 - Administrative Requirements, and the following:

1. Coordination per Section 01 31 14 - Coordination, and as follows:
    a. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting required per Section 01 70 00 - Execution and Closeout Requirements, and the following:
    1. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; Attendance by all relevant installers of related work shall be required.

C. Sequencing and Scheduling per Section 01 32 16 - Construction Progress Schedule.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals:
    1. Product Data: Test results of cast stone components made previously by the manufacturer.
        a. Include one copy of ASTM C1364 for Architect's use.
    2. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
    3. Stamped Engineered Details: Provide details of joint design for cast stone masonry piece sizes exceeding 1'-6" tall by 2'-6" in length for vertical application, stamped by Engineer licensed in Massachusetts.
    4. Mortar Color Selection Samples.
    5. Caulk Color Selection Samples: For cast stone masonry panels.
    6. Verification Samples: Pieces of actual cast stone components not less than 12 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
    7. Full-Size Samples, For Review:
        a. Basic Shapes: Two of each.
        b. Accent, Trim and Specialty Shapes: Two of each.
    8. Source Quality Control Test Reports.
    9. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

C. Sustainability Submittals:
    1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
    2. The Masonry Trade Contractor shall provide all documentation indicating applicability of products of this section to potential LEED credits to the project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
        a. Include documentation of:
            1) Post-Consumer and Pre-Consumer Recycled Content.
            2) Regional Materials: Extracted, manufactured, and purchased within 100 miles.
            3) Environmental Product Declarations (EPD).

D. Closeout Submittals:
    1. See Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
    2. Operation and Maintenance Data: Indicate surface cleaning instructions.

1.08 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. A firm with a minimum of fiveyears' documented experience producing cast stone of types required for project.
   2. Current producer member of the Cast Stone Institute.
   3. Manufacturer's production facility currently holds a Plant Certification from the Cast Stone Institute.
   4. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

B. Single Source Requirement: Provide all cast stone masonry units on project from a single manufacturer.

C. Source Quality Control: Test compressive strength and absorption of specimens selected at random from plant production.
   1. Test in accordance with ASTM C67 for Calcium Silicate Masonry Units, or ASTM C642 for Cast Stone Masonry Units.
   2. Comply with the requirements of the Cast Stone Institute Technical Manual and the project specifications. Where a conflict may occur, the Contract Documents shall prevail.
   3. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.
   4. Submit reports of tests by independent testing agency, showing compliance with requirements.

1.09 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building and includes the work of this section.
   1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 CONFIGURATIONS

A. Modular Size: 3-5/8 inches, 7-5/8 inches, and 11-5/8 inches high, 23-5/8 inches long, as shown on drawings.

B. Texture: Finish on exposed faces and ends:
   1. CSMU Type 1: Smooth Finish.
   2. CSMU Type 2: Rocked Finish.

C. Color: As selected by Architect from manufacturer's complete line of standard and non-standard colors.

2.02 FABRICATION TOLERANCES

A. Fabricate masonry units to the following tolerances:
   1. Unit Length: plus or minus 1/16 inch.
   2. Unit Height: plus or minus 1/16 inch.
   3. Deviation From Square: plus or minus 1/16 inch, measurement taken using the longest edge as the base.
   4. Custom Unit Dimensions: plus or minus 1/8 inch.

2.03 CALCIUM SILICATE MASONRY UNITS (CSMU)

A. Manufacturers: Subject to requirements of these specifications, provide equivalent products of one of the following:
   1. Basis of Design: Custom Cast Stone; Westfield IN - Color Nutmeg.
   2. Arriscraft International "Renaissance" Collection from Cambridge plant.
   3. Shouldice Designer Stone; Architectural Stone collection; Shallow Lake, Ontario, Canada.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Materials
   1. Calcium Silicate Masonry Units (CSMU): to ASTM C73, Grade SW; solid units that have been pressure formed and autoclaved; 3-5/8 inch bed depth; shapes as indicated.
   2. Color: "Nutmeg".
   3. Stone Veneer - matching limestone units for use at grade where salts or ground moisture will impact CSMU, as indicated on drawings: Dolomitic Limestone: meeting requirements of ASTM C568/C568M, Category III - High Density; as recommended by manufacturer; to match color and texture of CSMU Type 1.
      a. Modular Size: to match Calcium Silicate Masonry Units, unless specifically indicated as otherwise on drawings.
      b. Color: to match CSMU, unless indicated or scheduled as otherwise on drawings.
   4. Mortar: 1:1:6 Type N Portland cement-hydrated lime-sand mix, as specified in Section 04 20 00 - Unit Masonry.
   5. Grout: maximum 6,500 psi at 28 days, as specified in Section 04 20 00 - Unit Masonry.
   6. Flashing, Vents, and Masonry Accessories: as specified in Section 04 20 00 - Unit Masonry.

2.04 CAST STONE MASONRY UNITS

A. Manufacturers:
   1. Architectural Cast Stone:
      a. Any current producer member of the Cast Stone Institute meeting Manufacturer Requirements in Quality Assurance in Part 1 above.

B. Materials
   1. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
      a. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
      b. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
      c. Casting method: Vibrant Dry Tamp (VDT) for panels; Machine Produced for standard size units.
      d. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.

e. Remove cement film from exposed surfaces before packaging for shipment.

2. Shapes: Provide shapes indicated on drawings.
   a. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   b. Unless otherwise indicated on drawings, provide:
      1) Wash or slope of 1:12 on exterior horizontal surfaces.
      2) Drips on projecting components, wherever possible.
      3) Raised fillets at back of sills and at ends to be built in.
3. Reinforcement: Provide reinforcement required to withstand handling and structural stresses; comply with ACI CODE-318.

2.05 MATERIALS

A. Portland Cement: ASTM C150/C150M.
   1. For Mortar: Type I or II, except Type III may be used in cold weather.
B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
D. Admixtures: ASTM C494/C494M.
E. Water: Potable.
F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi), deformed bars, galvanized.
   1. Galvanized in accordance with ASTM A767/A767M, Class I.
G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of types and size required for conditions.
I. Mortar: Portland cement-lime, as specified in Section 04 05 11; do not use masonry cement.
J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00 - Unit Masonry.
B. If calcium silicate masonry units are used, provide the manufacturer's matching limestone units wherever CSMU is in contact or extending below grade. Units closer than 12 inches to adjacent grade or sidewalk locations shall be matching limestone product.
C. Set panels and units in configurations shown and as submitted and reviewed in shop drawings. Lay units in third-running bond.
D. Mechanically anchor each cast stone unit. Provide wall ties and anchors in accordance with Section 04 20 00 - Unit Masonry and manufacturer recommendations, whichever is more stringent shall apply.
E. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.

2. Set units in a full bed of mortar unless otherwise indicated.
3. Fill vertical joints with mortar.
4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
5. Head joints at coping stones and joints at column covers, cornices, platforms, soffits, window sills and in general all stone sections with projecting profiles, exposed top joints and rigid suspension connections to the supporting structure shall have soft sealant joints.
6. Where cast stone masonry piece sizes exceed conventional masonry units (1'-6" tall by 2'-6" in length for vertical applications) provide soft sealant joints. Submit details stamped by a professional engineer licensed in Massachusetts, per SUBMITTALS paragraph in PART 1 of this section.
    a. After setting, prime the ends of cast stone masonry units, insert properly sized backup rod and gun in sealant, in conformance with Technical Bulletin #43 of the Cast Stone Institute Technical Manual.
7. Vertical joints of cast stone masonry panels 18 inches and over shall be raked and caulked. Shorter joints shall be filled with mortar.
8. Large cast stone masonry panels shall be caulked all the way around, and supported on stone anchors.

3.03 CLEANING

A. Clean completed exposed cast stone after mortar is thoroughly set and cured.
    1. Wet surfaces with water before applying cleaner.
    2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
    3. Remove cleaner promptly by rinsing thoroughly with clear water.
    4. Do not use acidic cleaners.

3.04 PROTECTION

A. Protect completed work from damage.
B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

SECTION 05 00 01
MISCELLANEOUS METALS TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the State of Massachusetts, Chapter 149A, Sections 1 through 8, 10, and 11, as most recently amended.

B. Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitations to Bid and the Instructions to Bidders, accompanied by the bid bond specified therein.

C. Every Trade Bid for work under this section shall be on a form included in this Project Manual, furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Miscellaneous Metals Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. Coordinate work with that of all other trades affecting or affected by work of this section. Cooperate with such trades to ensure the steady progress of all work under the Contract.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the subcontractor or an entity engaged by the subcontractor, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch who is not otherwise employed as active installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this section includes furnishing and installing all metal fabrications and other components that are not part of the structural steel or other metal systems in other sections of the specifications including all accessories necessary to provide a complete installation, as shown on drawings, as described in specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 05 00 01 or the abbreviation "SC-MTLS".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:
   1. Section 05 50 00 - Metal Fabrications.
   2. Section 05 51 00 - Metal Stairs.
   3. Section 05 52 13 - Pipe and Tube Railings.
   4. Section 05 53 05 - Metal Gratings and Floor Plates.
   5. Section 05 73 00 - Decorative Metal Railings.

D. When required by individual technical specification sections, the work of this section shall include "delegated design" engineering by a Professional Engineer licensed by the State of Massachusetts for selective items as described in each section included herein.

E. This Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Commissioning Sections 01 91 13 - MEP Commissioning Requirements and 01 91 19 - Building Envelope Commissioning: list of items to be commissioned and requirements for cooperation with the Commissioning Agent; and required field testing.
   2. Section 03 30 00 - Cast-in-Place Concrete.
   3. Section 03 45 00 - Precast Architectural Concrete.
   4. Section 03 54 00 - Concrete Toppings.
   5. Section 04 20 00 - Unit Masonry.
   6. Section 04 72 00 - Cast Stone Masonry.
   7. Section 05 12 00 - Structural Steel Framing.
   8. Section 05 31 00 - Steel Decking.
   9. Section .07 54 00 - Thermoplastic Membrane Roofing
   10. Section 07 84 00 - Firestopping.
   11. Section 07 92 00 - Joint Sealants.
   12. Section 08 36 13 - Sectional Doors.
   13. Section 09 91 13 - Exterior Painting.
   14. Section 09 91 23 - Interior Painting.
   15. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.
   16. Section 10 44 00 - Fire Protection Specialties.
   17. Section 14 24 00 - Hydraulic Elevators.
   18. Division 21: Fire Protection sections.
   19. Division 22: Plumbing sections.
   20. Division 23: HVAC sections.
   21. Division 26: Electrical sections.

F. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

G. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Contractor shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Phasing Plans, Demolition Plans, and all project detail sheets

for general and code-related information, installation or other conditions and instructions that directly affect their work.

H. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

J. Cutting and Patching:
   1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical specification sections. Where any of the sections listed as part of this Trade Bid indicate that cutting and coring shall be performed by parties other than the Miscellaneous Metals Trade Contractor, the cost of such cutting and coring necessary for the work of this section shall be borne by this Miscellaneous Metals Trade Contractor.
   2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
   3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
   4. Any and all cutting of structural members, including floor slabs, shall require approval of the Structural Engineer of Record; see Structural Drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those shown on Structural Drawings, obtain approval from Structural Engineer of Record.
   5. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for Reference Standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See each individual technical specification section listed above for required product information, samples, shop drawings, and other submittals required.

1.06 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Perform design under direct supervision of a Professional Structural Engineer experienced in design of this type of work and licensed in Massachusetts.

B. See each individual technical specification section listed above for quality assurance requirements.

C. See Section 01 40 00 - Quality Requirements for additional requirements.

1.08 MOCK-UPS

A. See each individual technical specification section listed above for requirements for prototype mock-ups of full or partial assemblies.

1. See Section 01 40 00 - Quality Requirements for general requirements for mock-ups.

1.09 WARRANTY

A. See each individual technical specification sections listed above for specific warranty requirements.

B. See Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS)

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

3.01 CLEANING

A. Miscellaneous Metals Trade Contractor shall be responsible for cleaning up Miscellaneous Metals Trade Contractor's own work at the end of each day, and depositing waste and debris created by Miscellaneous Metals Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. All materials and labor required for the completion of the work of this Section including but not limited to:
   1. Furnishing of leveling plates, bearing plates, columns, beams, base plates, bracing, and connections (bolted angles, channels, stiffeners, separator plates, clips, supports for steel deck at columns, connections, welding filler metal, and electrodes anchor bolts, connection bolts, and erection bolts).
   2. Items of structural steel required to be built into concrete or masonry as indicated or specified shall be furnished to the respective trades at the proper time with complete instruction and templates to facilitate inspection.

B. Unless specifically excluded, furnishing and installation of all other items for structural steel work indicated on the Drawings, specified, or required to make the work of this Section complete.

C. Items to be furnished only:
   1. Furnish the following items for installation under designated Sections:
      a. Anchor Bolts: Furnish to Section 03 30 00 and 04 20 00
      b. Leveling Plates: Furnish to Section 03 30 00 and 04 20 00
      c. Embedded Plates: Furnish to Section 03 30 00 and 04 20 00

D. Sustainable Design Intent: 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 Division 01 Section “SUSTAINABLE DESIGN REQUIREMENTS” for certification level and certification requirements.

E. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to the Owner’s LEED v4 BD+C Certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

F. Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.02 RELATED REQUIREMENTS

A. The Conditions of the Contract and General Requirements of the Project Manual including the General Contractor’s Scoping documents apply to this subcontractor, material suppliers, and all other persons furnishing labor and materials under this Section. General Conditions, Supplementary Conditions, General Contractor’s Scoping documents, and applicable parts of Division 01 are included as part of this Section.

B. Work described in other Sections which contain requirements applicable to the work of this Section, or with which this subcontractor shall coordinate the Work of this Section include, but are not limited to the following:
   1. Section 01 45 23 – TESTING AND INSPECTING SERVICES
   2. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
   3. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
   4. Section 04 20 00 - UNIT MASONRY
   5. Section 05 31 00 - STEEL DECKING
   6. Section 05 15 00 - STUD SHEAR CONNECTORS
   7. Section 05 50 00 - METAL FABRICATIONS; steel lintels and light steel framing provided by those sections and connecting to work of this section.

8. Section 05 51 00 – METAL STAIRS; connection of metal stairs to structural steel, and reactions imposed.
9. Section 07 21 19 – FOAMED-IN-PLACE INSULATION; surface preparation of steel scheduled to receive foam insulation.
10. Section 07 81 00 – APPLIED FIREPROOFING; surface preparation of steel scheduled to receive fireproofing.
11. Section 14 24 10 – HYDRAULIC ELEVATORS; requirements and coordination for hoisting safety beam.
12. Section 23 00 10 – HVAC; coordination and requirements of steel-framed floor and roof openings for HVAC ducts and equipment.
13. Section 26 00 10 – ELECTRICAL; grounding of electrical system to steel frame.

1.03 GENERAL REQUIREMENTS

A. Examine all other Sections of the specifications and drawings for the relationship of the work under this section and the work of other trades. Cooperate with all trades and coordinate all work under Section therewith.

1.04 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.

1.05 QUALITY ASSURANCE

A. The General Contractor shall have available one copy of each of the following literature including latest revisions, which are hereby included in and made part of these specifications:
B. Commonwealth of Massachusetts State Building Code
C. AISC: "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings".
D. AISC: "Code of Standards Practice for Steel Bridges and Buildings".
E. AISC: "Specification for Structural Joints using High-Strength Bolts".
F. AWS: "Code for Welding in Building Construction", with Addenda.
G. Any material or operation specified by reference to the published specifications of a manufacturer, the American Society for Testing and Materials (ASTM), the American Institute of Steel Construction (AISC), the American Welding Society (AWS), the Industrial Fasteners Institute (IFI), the Steel Structures Painting Council (SSPCV), the American National Standards Inst. (ANSI), or other published standard, shall comply with the standard listed. In case of conflict between the referenced specifications, the one having the most stringent requirement shall govern. In case of conflict between the referenced specifications, and the project specifications, the project specification shall govern.

1.06 SUBMITTALS

A. Samples and shop drawings are to be submitted to the Architect for approval in accordance with Section 01 30 00 – ADMINISTRATIVE REQUIREMENTS.
B. Shop drawings, erection drawings, certifications, and schedules, properly checked and coordinated with other parts of the construction, are to be submitted to the Architect for approval.
C. Without limiting the generality of the items mentioned below, shop drawings shall be complete and shall include all information necessary for the fabrication and erection of the component parts of the structure.
D. These drawings shall show: Type of steel for each member; location and identification mark of each member; dimensions, size and weight of members; connection load, type and identification mark and camber; location and size of cuts, copes, slots, holes and openings required by other trades; type, size, and extent of all welds; joint welding procedures; welding sequence; and painting requirements (The welding symbols used shall be as adopted by the American Welding Society).

E. These drawings shall show all requirements such as temporary members required for erection including connections.

F. Submit shop drawings in electronic PDF format. The documents have to be searchable and resolution independent. The PDF documents should be created directly from the detailing software and cannot be scanned from printed or hand-drawn sketches.

G. Along with the searchable PDF erection plans for each submission, provide a 3D, searchable model showing all of the structural members that are required to be reviewed. The model should be provided with a free viewer. The common detailing programs that have a free viewer available are: SDS/2, Tekla BIM sight and SOLIBRI.

H. Except as otherwise noted the approval of shop drawings will be for size and arrangement of principal and auxiliary components and strength of connections. Any error in dimensions shown on the shop drawings shall be the responsibility of the General Contractor.

I. Fabrication of any material, cutting of any holes or performance of any work shall not proceed until shop drawings have been reviewed by the Architect.

J. Certified copies of mill test reports including names and locations of mills and shops and analysis of chemical and physical properties, of steel to be used on this project shall be submitted to the Architect before delivery to the job site.

K. Manufacturer's certification of bolts, nuts, and filler metal for welding shall be submitted to the Architect.

L. The General 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.

M. Methods of Erection: Prior to starting work the General Contractor shall submit to the Architect a description of the methods, sequence of erection, and type of equipment he proposes to use for erecting the structural steel work. This submission or approval shall not relieve the General Contractor of his responsibility for providing the proper methods, equipment, workmanship, or safety precautions.

1.07 LEED SUBMITTALS

A. This subcontractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the Project LEED Administrator for submission to LEED-Online: https://leedonline.usgbc.org. Refer to Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS for all requirements; and Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.08 DELEGATED CONNECTION DESIGN

A. Design structural steel connections indicated in the contract documents per AISC 303, Option Three, using the connection loads indicated. Submit design calculations for steel connections signed and sealed by a registered professional engineer.

1.09 TESTING AND INSPECTION

A. Inspection, Testing, and Quality Control:

B. 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 initial inspection and testing shall be borne by the Owner. This subcontractor shall be responsible for re-inspection or retesting of defective work.

C. 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 the Testing Agency. Such inspection and testing shall not relieve the General 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.

D. The General Contractor and Testing Agency shall examine the contract documents and become thoroughly acquainted with detailed inspection and testing requirements as outlined by the SER.

E. The General Contractor shall cooperate with and facilitate inspection and testing by the SER and/or the Testing Agency. The General Contractor shall furnish, at his own expense, 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.

F. The Testing Agency shall inspect and test all welded and bolted work.

G. 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 General Contractor's expense and to the satisfaction of the SER and/or the Testing Agency. The SER or the Testing Agency shall require drawings showing proposed corrective work to be submitted for review.

H. The General Contractor shall notify the SER and/or the Testing Agency five 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 pocketknife will be subject to re-cleaning and repainting at the expense of the General Contractor.

I. 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 General Contractor to the satisfaction of the SER and/or the Testing Agency.

J. 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 it is found to be defective in any way.

1.10 QUALIFICATIONS

A. The General Contractor shall submit conclusive evidence to the Owner that the fabricator and the erector has satisfactorily completed projects of similar scope and have adequate fabrication facilities to meet production requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. All steel is to consist of a minimum of 95 percent recycled steel with over 80 percent post-consumer and 15 percent pre-consumer recycled content as defined in the USGBC LEED for Schools v4 credit descriptions.

B. All wide flange shapes shall be newly rolled steel conforming to ASTM A992, Fy = 50 KSI. unless noted otherwise on drawings.

C. All bars, plates, channels, and angles shall conform to ASTM A36 unless otherwise indicated on the drawings.

D. Structural tubing shall conform to ASTM A500, Grade C with minimum yield strength Fy = 50 KSI.

E. Structural pipe shall conform to ASTM A53, Grade B.

F. Anchor bolts shall conform to ASTM A307 or ASTM F1554 Fy = 105 KSI as noted or otherwise shown on the drawings.

G. High strength bolts ASTM F3125 with ASTM A563, Grade A Hex style nuts, and compatible washers. Bolts shall be cold forged with rolled threads. Bolts with torque control snap-off ends may be used.

H. Hot Dip Galvanizing shall conform to the latest ASTM specification as specified in Section 2.04 below.

I. Filler metal for welding shall conform to AISC Code, 2010 Edition, Section l.4.5.

2.02 FABRICATION

A. Applicable Standards: Except as otherwise noted on the drawings or specified, the fabrication of structural steel shall be in accordance with the AISC specifications, such as will permit proper erection.

B. Provision for attachment of other materials: Punch and drill steel for attachment of other materials indicated on the drawings or noted in the specifications to be attached to the steel.

C. Connections: Weld or bolt shop connections as indicated. Bolt field connections except where welded connections are indicated.

1. Provide high strength threaded fasteners for principal bolted connections except where unfinished bolts are indicated.
2. Provide shear tab connections for all beam to column connections where the column width is 6 inches or less.
3. For columns that are seven inches or wider, provide a double angle connection.

D. High strength bolted construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using High-Strength bolts."

E. Welding:

1. Quality control and qualification of welding procedures and operations shall be as specified under Paragraph 1.5 and 2.3 of this section.
2. Shop welding shall be done by either shielded metal-arc welding or submerged arc-welding.
3. All groove welds shall have complete penetration unless otherwise noted on the drawings.
4. Where structural joints are required to be welded, the details of all joints, the technique of welding employed, the appearance and quality of welds made and the methods used in correcting defective work shall conform to the applicable requirements of the specifications under "QUALITY ASSURANCE" in this Section.
5. The General Contractor shall prepare joint welding procedures for all welded joints which shall be approved by the SER or the Testing Agency before any welding is done. After approval, these welding procedures shall be followed without deviation unless specific approval for change is obtained from the Architect. The SER may require re-qualification of any of these welding procedures by tests prescribed in the AWS "Standard Qualification Procedure".

F. Oxygen cutting: Manual Oxygen cutting shall be done only with a mechanically-guided torch. Alternatively an unguided torch may be used provided the cut is not within a ½ inch of the finished dimension and the final removal is completed by chipping or grinding to produce a surface quality equal to that of the base metal edges. The use of oxygen-cut holes for bolted connections will not be permitted; components prepared in this manner will be rejected.

G. 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 General Contractor shall submit to the Architect and/or SER for approval, drawings showing details of proposed corrective work and shall receive approved drawings prior to performing the corrective work. All corrective work shall be solely at General Contractor’s expense.

H. Identification: All structural steel members shall have assigned positions and identification marks or symbols, plainly indicated thereon near one end. Marks shall agree with those given on the shop drawings and erection drawings relating to or calling for the member.

I. Special care used in the handling and fabricating of exposed steel indicated on the drawings and as follows:
   1. Locate field joints at concealed locations if possible.
   2. Fabricate with exposed surfaces smooth, square and free of surface blemishes including pitting, rust, scale and roughness.
   3. Grind sheared, punched and flame-cut edges to remove burrs and provide smooth surfaces and edges.
   4. Fabricate steel with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
   5. Fabricate steel with exposed surfaces free of seams to maximum extent possible.
   6. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating and shop priming.
   7. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.

2.03 SOURCE QUALITY CONTROL

A. The General Contractor shall maintain his own quality control and inspection of all shop and field work. Quality control and inspection of all welding work shall consist of meticulous supervision by the General Contractor's own welding inspector using non-destructive spot testing, at the rate of at least one test per 50 linear feet of weld by each welder, except that full penetration welds shall be tested 100 percent. Non-destructive testing shall be done by the radiographic-magnetic particle or ultrasonic method; whichever is most effective for the joint to be tested.

B. 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 it is found to be defective in any way.

2.04 GALVANIZING

A. Any items so noted or specified.

B. Galvanizing shall be hot dip galvanized after fabrication in compliance with ASTM specifications A123, A153, or A386 where applicable. All galvanized materials must be inspected for compliance with these specifications and marked with a stamp indicating the ASTM number and the weight of the zinc coating in ounces per square foot. Galvanizer shall furnish a notarized statement of compliance with all specifications.

C. Reference Standards:
   1. ASTM A153 for galvanizing iron and steel hardware.
   2. ASTM A123 for galvanizing rolled, pressed and forged steel shapes, plates, bars, and strips one-eighth of an inch thick and heavier.
   3. ASTM A386 for galvanizing assembled steel products.
   4. AHDGA Publication, "Inspection Manual for Hot Dip Galvanized Products"
   5. ASTM A563 for tapping nuts after galvanizing.
   6. ASTM F3125 for galvanizing high strength bolts.

D. Grade Stamps and Certifications: Each piece of galvanized metal shall be inspected and stamped with ASTM number and weight in ounces per square foot applied. Furnish Certificates of Compliance signed by General Contractor and galvanizer stating that galvanizing complies with these specifications.

E. Packaging and Handling after Galvanizing: Suitable to prevent damage to galvanized surfaces and distortion of steel. Avoid wet stain by ensuring free circulation or air around stored material.

F. Fabricator's Responsibilities: Furnish to Galvanizer shop drawings of non-standard fabrications to coordinate fabrication with galvanizing and to avoid problems with warpage due to improper provisions for hot-dipping.

G. Touch-Up: Touch-up abraded surfaces adjacent to weldments section using 95 percent (by weight) organic zinc-rich paint over wire brush preparation per ASTM A780. DFT shall equal thickness required for galvanized coating in the reference standards.

2.05 SURFACE PREPARATION AND PAINTING

A. Applicable Standards: Except as otherwise indicated on the drawings or specified, the painting of structural steel shall be in accordance with the Structural Steel Painting Council (SSPC) specifications under "Requirements of Regulatory Agencies".

B. Steel to be left unpainted - Thoroughly clean all steel of all loose mill scale in accordance with SSPC SP-3. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter. Oil and grease deposits shall be removed:
   1. Contact surfaces including high-strength bolted connections.
   2. Steel indicated on the drawings to be encased in concrete.
   3. Top flange of beams to receive metal decking or steel shear studs.
   4. Steel to receive spray fireproofing.
   5. All other steel to receive primer or paint.

C. Steel to be painted - Thoroughly clean all steel of all loose mill scale in accordance with SSPC SP-3. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter. Oil and grease deposits shall be removed. At exposed steel to receive High Performance Coatings – prepare surfaces in accordance with SSPC SP-6 Commercial Blast Clean. Abrasive blast cleaned surfaces shall exhibit a uniform, angular profile of one and one half – three mils.
   1. Unless specifically excluded, all structural steel shall receive one shop coat of primer paint. Refer to the Drawings for locations of steel to receive High Performance Coatings.
   2. Surfaces requiring paint shall be painted only to within two inches of any field weld. If for any reason the surface to be field welded is painted, such paint shall be completely removed in the shop to within the stated limits before field welding.
   3. Surfaces, inaccessible after assembly, excluding bolted, finished, or welded surfaces at connections. Surfaces encased in exterior building insulation shall receive two coats of primer paint.

D. Shop Primer: All ferrous metal surfaces, except pre-finished galvanized items and those obviously not to be painted shall, before leaving the shop or manufacturing plant, be cleaned of all scale, rust, grease, and other foreign matter and shall be given one thorough shop coat, on all surfaces of a metal primer, ready and compatible for finish painting at the building site. Primer shall be Tnemec Co. #1009 Gray Metal Primer or approved equal, and shall be compatible with materials to be used in field painting and shall be used directly from factory labeled containers. Touchup damaged and abraded spots after installation using same paint.
   1. After steel has been properly prepared as specified above, apply primer paint to dry steel surfaces by brush, spray, or roller assuring no running or sagging in accordance with manufacturer's directions. Cleaned surfaces shall be primed within 8 hours of cleaning and prior to any surface rusting.
   2. The coverage rate per coat shall not be more than 400 square feet per gallon resulting in a wet film thickness of two mils.
   3. Inspection of shop painting shall be specified under "Inspection, Testing and Quality Control" in this Section.

E. Steel to be galvanized - Thoroughly clean all steel of all loose mill scale in accordance with SSPC SP-3. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter. Oil and grease deposits shall be removed.

2.06 PRODUCT HANDLING

A. Handle, transport, and stack all materials carefully to prevent deformation or damage. Store all structural steel members carefully on substantial timbers and blocking, so arranged that the steel will not be in contact with the earth and properly drained, preventing any spattering with dirt or accumulation of water in or about the steel. Take care to prevent the accumulation of mud or other foreign matter on the steel.

PART 3 EXECUTION

3.01 ERECTION

A. The General Contractor shall survey the anchor rods prior to the erection of structural steel and shall notify the design team of any misplaced anchor rods that require remedial work.

B. Applicable Standards: Except as otherwise indicated on the drawings or specified, the erection of structural steel shall be in accordance with the AISC Specification listed under "Requirements of Regulatory Agencies".

C. All beams shall be installed web normal. Add shims or other accessories to support pitched deck.

D. Methods of Erection: Prior to starting work the General Contractor shall submit to the Architect a description of the methods, sequence of erection, and type of equipment he proposes to use for erecting the structural steel work. This submission or approval shall not relieve the General Contractor of his responsibility for providing the proper methods, equipment, workmanship, or safety precautions.

E. Temporary Floors: All temporary flooring, planking, and scaffolding necessary in connection with the erection of the structural steel or the support of erection machinery shall be provided as a part of the erection work. The temporary floors shall be according state and municipal laws and governing safety regulations.

F. Field Connection: Unless otherwise indicated, shall be welded or bearing-type (N) high strength bolts tightened to provide the minimum tension shown in Table J3.7 of AISC "Manual of Steel Construction". Unless otherwise indicated, beams shall have framed double angle connections using ¾ inch diameter (minimum) high strength bolts in accordance with the requirements of the AISC "Manual of Steel Construction".

3.02 WELDING

A. Field welding shall be executed in accordance with all the requirements under "Fabrication Welding" in this Section, excepting those requirements that manifestly apply to shop conditions only.

B. All field welding shall be performed by manual shielded metal-arc welding only.

C. Oxygen cutting in the field will not be permitted without prior approval of the SER.

3.03 GUARANTEE

A. The General Contractor shall furnish to the Owner a written guarantee covering all defects in materials and workmanship that occur within a period of one year from the date final of completion of the building. Should any defects in materials and workmanship develop within this time, all necessary repairs and replacements shall be made at no additional cost to the Owner.

END OF SECTION

SECTION 05 15 00
STUD SHEAR CONNECTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide all labor, materials, equipment, and services to furnish and install all steel stud shear connectors, as shown on the drawings.

B. Sustainable design intent: 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 Division 01 Section "SUSTAINABLE DESIGN REQUIREMENTS" for certification level and certification requirements.

C. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to the Owner's LEED v4 BD+C certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

D. Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.02 RELATED REQUIREMENTS

A. The conditions of the contract and general requirements of the project manual including the General Contractor's scoping documents apply to this subcontractor, material suppliers, and all other persons furnishing labor and materials under this section. The General Conditions, supplementary conditions, General Contractor's scoping documents, and applicable parts of Division 01 are included as part of this section.

B. Work described in other Sections which contain requirements applicable to the work of this Section, or with which this subcontractor shall coordinate the Work of this Section include, but are not limited to the following:

1. Section 01 45 23 – TESTING AND INSPECTING SERVICES.
2. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: procedural and administrative requirements for construction and demolition recycling.
3. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
4. Section 03 30 00 - CAST-IN-PLACE CONCRETE.
5. Section 05 12 00 - STRUCTURAL STEEL FRAMING.
6. Section 05 31 00 - STEEL DECKING.

1.03 SUBMITTALS

A. Submit complete layout shop drawings drawn no smaller than 1/8 inch equal to one foot. 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 DECKING.

B. Manufacturer's catalogue shall be submitted with the shop drawings

1.04 LEED SUBMITTALS

A. This subcontractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator for submission to LEED-Online: https://leedonline.usgbc.org. Refer to Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS for all requirements; and Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.05 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.
3. International Building Code (IBC) 2021, with Massachusetts amendments.
4. MSBC – Massachusetts State Building Code, 10th Edition. 780 CMR.

1.06 TESTING AND INSPECTION

A. Inspection, testing, and quality control: 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 an independent testing agency. All costs for initial inspection and testing shall be borne by the owner. This subcontractor shall be responsible for costs associated with re-inspection or retesting of work identified as defective.

PART 2 PRODUCTS

2.01 MATERIALS

A. 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 pounds per square inch. The studs shall be ¾ inch 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 grade suitable for welding complying with ASTM A-109 requirements. Note that steel beams are made from steel conforming to ASTM A-572, Grade 50.

B. All steel is to consist of a minimum of 95 percent recycled steel with over 80 percent post-consumer and 15 percent pre-consumer recycled content as defined by the USGBC LEED for Schools v4 credit descriptions.

PART 3 EXECUTION

3.01 QUALITY CONTROL

A. Before beginning work, inspect all conditions to receive work and notify the Owner 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, as suitable to properly receive the work, and any defects resulting from such accepted conditions shall be corrected at no additional cost to the Owner.

C. A minimum of two 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 the vertical, without weld failure, to test installation procedures.

D. If, after welding, visual inspection reveals that a sound weld or full 360-degree fillet has not been obtained for a particular stud, the stud shall be hammer bent approximately 15 degrees off perpendicular to the nearest end of the beam or bent away from the opening in the fillet.

E. Three 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 stud in each 100 shall be tested after cooling. Studs shall not be welded when temperature is below zero 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.

1. It shall be noted that the studs may be used to attach the steel decking specified in Section 05 31 00 – STEEL DECKING.

2. 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 21 00
STEEL JOIST FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish and install the following items required to complete the work of this Section as shown on the drawings and specified herein:
   1. Open web steel joists, designed, fabricated, and erected in conformance with the Steel Joist Institute (SJI) and American Institute of Steel Construction (AISC).
   2. All bridging, bracing, and accessories
   3. Bottom & top chord extensions
   4. Shop painting of all steel joists and field touch up after erection.
   5. Coordinate bridging with mechanical.

B. Sustainable Design Intent: 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 Division 01 Section "SUSTAINABLE DESIGN REQUIREMENTS" for certification level and certification requirements.

C. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to the Owner's LEED v4 BD+C certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

D. Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.02 RELATED REQUIREMENTS

A. The Conditions of the Contract and General Requirements of the Project Manual including the General Contractor's Scoping documents apply to this subcontractor, material suppliers, and all other persons furnishing labor and materials under this Section. General Conditions, Supplementary Conditions, General Contractor's Scoping documents, and applicable parts of Division 01 are included as part of this Section.

B. Work described in other Sections which contain requirements applicable to the work of this Section, or with which this subcontractor shall coordinate the Work of this Section include, but are not limited to the following:
   1. Section 01 45 23 - TESTING AND INSPECTING SERVICES.
   2. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
   3. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
   4. Section 03 30 00 - CAST-IN-PLACE CONCRETE.
   5. Section 05 12 00 - STRUCTURAL STEEL FRAMING.
   6. Section 04 20 00 - UNIT MASONRY.
   7. Section 05 31 00 - STEEL DECKING.
   8. Section 05 50 00 - METAL FABRICATIONS.
   9. Section 07 54 00 – THERMOPLASTIC MEMBRANE ROOFING.
   10. Section 11 66 23 – GYMNASIUM EQUIPMENT: gym equipment suspended from and imposing point loads on joist framing.
   11. Section 21 00 10 – FIRE PROTECTION: piping and equipment suspended from and imposing point loads on joist framing.
   12. Section 22 00 10 – PLUMBING: piping and equipment suspended from and imposing point loads on joist framing.

13. Section 23 00 10 – HVAC: piping and equipment suspended from and imposing point loads on joist framing, coordination of framed openings at roof for penetrations.

1.03 SUBMITTALS

A. Submit complete shop drawings in accordance with the provisions of Section 01 30 00 – ADMINISTRATIVE REQUIREMENTS.

B. Shop drawings shall include information necessary for complete fabrication and erection of component parts of structure.

1. Shop drawings shall show: Identification marks of members, dimensions, size, arrangement, and weights of members, bridging, requirements, such as punched or drilled holes, for attachment of other materials or parts of construction; type, size, and location of shop and field connections; type, size, and extent of welds; joint welding procedures, welding sequences, type, and dry thickness of paint. (Use welding symbols adopted by American Welding Society).

C. Prepare complete design calculations, properly coordinated with joist placement plans, for each specific type of steel joist indicated on the drawings. Calculations shall be signed and sealed by a professional engineer registered in the Commonwealth of Massachusetts. Submit to the Architect for review. Submittal shall include the following:

1. Non-SJI standard bridging details (e.g. for cantilevered condition, net uplift)
2. Connection details for:
   a. Non-SJI standard connections (e.g. flush framed or framed connections)
   b. Field splices
   c. Joist headers

D. Review of shop drawings will be for type, size, and arrangement of principal and auxiliary components and strength of connections. Dimensional errors on shop drawings are the responsibility of the General Contractor.

E. A notarized affidavit from an officer of the joist fabricator shall be required, listing each material that is used, its required applicable specification, and a statement that the materials comply with the applicable specifications.

1.04 LEED SUBMITTALS

A. This subcontractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator for submission to LEED-Online: https://leedonline.usgbc.org. Refer to 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS for all requirements; and Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.05 QUALITY ASSURANCE

A. General: Provide joists fabricated in compliance with the Steel Joist Institute (SJI) "Standard Specifications, Load Tables, and Weight Tables for Steel Joists and Joist Girders".

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. Qualification of field welding: Qualify welding process and welding operators in accordance with the American Welding Society (AWS) "Structural Welding Code - Steel" AWS D1.1.

D. Inspection: Inspect joists and girders in accordance with SJI "Specifications".

1.06 TESTING AND INSPECTION

A. Inspection, Testing, and Quality Control: 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 initial inspection and testing shall be borne by the Owner. This subcontractor shall be responsible for costs associated with re-inspection or retesting of defective work.

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 testing agency. Such inspection shall not relieve the General 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 testing agency and/or SER. The fabricator shall, when requested, aid the inspectors in carrying out their duties.

1.07 GUARANTEE

A. The General Contractor shall furnish to the Owner a written guarantee covering all defects in materials and workmanship of the work of this Section that occur within a period of one year from the date of final completion of the building. Should any defects in materials or workmanship develop within this time, all necessary repairs and replacements shall be made at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. All steel is to consist of a minimum of 95 percent recycled steel with over 80 percent post-consumer and 15 percent pre-consumer recycled content as defined in the USGBC LEED for Schools V4 credit descriptions.

B. Steel for joist members shall be newly fabricated and shall comply with the Standard Specifications of the Steel Joists Institute, latest issue, and the Standard for Steel Construction current edition published by AISC. Material for bridging shall conform to ASTM A-36.

1. Selection of steel type shall conform to the standard specifications for steel joists of the type (K), (KCS), (LH), and (DLH) being used of the American Institute of Steel Construction and the Steel Joist Institute.

C. Filler metal for Welding: Shall conform to AWS.

D. Paint: Paint for shop coats on all steel joists shall be one prime coat of Tnemec #1009 Gray by Tnemec Co., Kansas City, Missouri or approved equal.

2.02 DESIGN AND FABRICATION

A. All open web steel joists shall be designed and fabricated in accordance with the Standard Specifications for Open Web Steel Joists and adopted by the Steel Joist Institute (SJI) and the AISC and as specified herein.

B. Joist shall be fabricated by a member of the Steel Joist Institute.

C. Top and bottom chord members shall be limited in shape to angles or structural tees for all joists.

D. Substitutions of sections or modifications of details or both shall be made only with the prior written review of the Architect and/or the SER.

E. The General Contractor shall furnish the following:

1. A certified mill test report covering chemical and physical properties of steel used in joists
2. A certificate stating that the joists conform to or exceed the requirements of the Steel Joist Institute.

2.03 ACCESSORIES

A. Bridging for joists shall be in conformance with recommended practices of the SJI Specifications.

B. All bridging rows shall be spaced no further than is standard with SJI Specifications. Provide anchors for all ends of bridging lines terminating at walls or beams. Positive anchorage shall be provided at the ends of each bridging list at both top and bottom of chords. Where joists are too close to parallel walls for bridging, provide sidewall anchors.

C. Ceiling extensions shall be either an extended bottom chord or a separate unit as standard with the manufacturer. Provide ceiling extensions where hung ceilings are indicated on the drawings and where so indicated on the structural drawings. Provide hangers for the ceiling extension to limit the deflection of the free end.

D. Headers, trimmers, and bearing plates shall be manufacturer's standard items.

E. Provide extended ends for top and/or bottom chords of steel joists where indicated on the drawings.

2.04 PAINTING

A. Joists, bridging, anchors, and other accessories shall be cleaned of all rust, scale, weld slag and weld splatter, oil and grease deposits, and given one shop coat of primer paint as specified herein.

B. Joists receiving spray fireproofing shall not be painted and shall be SSPC - SP3.

2.05 HANDLING, SHIPPING AND STORAGE

A. Care shall be exercised at all times to avoid damage through careless handling. Materials shall be unloaded and placed on skids; dumping onto the ground will not be permitted.

B. All materials shall be stored off the ground in a well-drained location and protected from the weather. No damaged or bent joists may be used or installed.

PART 3 EXECUTION

3.01 ERECTION

A. All steel joists shall be erected in accordance with the procedures and details shown on the reviewed shop drawings, as shown on the contract drawings, and in strict conformance with the Standard Specifications for open web steel joists.

B. Unless otherwise shown, joists shall bear a minimum of three inches on structural steel. The end of bearing shall extend one inch beyond the centerline of the beam or column, except where joists abut each other. Each joist shall be anchored to the steel supports with a minimum 1/8 inch fillet weld two inches long, each side.

C. The joists shall be permanently fastened to supports and all bridging and anchors completely installed before any construction loads (other than workmen) are placed on the joists.

D. All bridging shall be installed within three inches of panel points.

E. Field welding shall be executed in accordance with the "Code of Arc and Gas Welding in Building Construction", of the AWS, and only by welding operators who have been previously qualified to perform the type of work involved.

F. No burn holes will be permitted in the chords of the joists. Any joist whose chords have burn holes which damage 20 percent or more of the chord section shall be reinforced or replaced where exposed.

G. Concentrated loads over 150 pounds hung from the top or bottom chord shall be located at a panel point or a panel point shall be provided by adding a diagonal web member. No concentrated load shall be hung from the joists without authorization from the SER.

H. As erection progresses, the work shall be securely bolted or welded to take all dead loads, wind, and erection loads. No permanent welding shall be performed until the structure has been properly aligned.

END OF SECTION

SECTION 05 31 00
STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish and install the following items required to complete the work of this Section as shown on the drawings and specified herein:
   1. Roof and floor deck.
   2. Closure plates, bent angle plates, sump pans, hanger tabs, and accessories for fastening the deck to the steel frame, perimeter closure angles, and closure angles around interior openings.

B. Sustainable Design Intent: 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 Division 01 Section "SUSTAINABLE DESIGN REQUIREMENTS" for certification level and certification requirements.

C. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to the Owner's LEED v4 BD+C certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

D. Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.02 RELATED REQUIREMENTS

A. The Conditions of the Contract and General Requirements of the Project Manual, including the General Contractor's Scoping documents apply to this subcontractor, material suppliers, and all other persons furnishing labor and materials under this Section. General Conditions, Supplementary Conditions, General Contractor's Scoping documents, and applicable parts of Division 01 are included as part of this Section.

B. Work described in other Sections which contain requirements applicable to the work of this Section, or with which this subcontractor shall coordinate the Work of this Section include, but are not limited to the following:
   1. Section 01 45 23 - TESTING AND INSPECTING SERVICES.
   2. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
   3. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
   4. Section 05 12 00 - STRUCTURAL STEEL FRAMING.
   5. Section 05 15 00 - STUD SHEAR CONNECTORS.
   6. Section 07 54 00 – ELASTOMERIC MEMBRANE ROOFING.
   7. Section 07 81 00 – APPLIED FIRE PROTECTION; surface preparation of steel scheduled to receive fireproofing.
   8. Section 23 00 10 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC); coordination and requirements of steel-framed floor and roof openings for HVAC ducts and equipment.

1.03 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 07 54 00 – ELASTOMERIC MEMBRANE ROOFING.

1.04 QUALITY ASSURANCE

A. Any material or operation specified by reference to the published specifications or a manufacturer, the American Society for Testing and Materials (ASTM), the American Welding Society (AWS), the American Iron and Steel Institute (AISI), the Steel Deck Institute (SDI), or other published standard, shall comply with the requirements of the current specifications or

standard listed. In case of a conflict between the referenced specification and the project specification, the project specification shall govern.

B. The General Contractor shall furnish a notarized affidavit from an officer of the deck manufacturer listing each material that is used, its required applicable specification, and a statement that the materials comply with the applicable specifications. However, such certification shall not relieve the General Contractor from the responsibility of complying with any added requirements specified herein.

C. Deck and erection methods shall conform to the Handbook of Industrial Loss Prevention, Chapter 75, "Wind Forces and Roof Anchorage Design", published by Factory Mutual Engineering and Research of Norwood, Massachusetts.

1.05 SUBMITTALS

A. Notarized affidavit from an officer of the deck manufacturer listing each material that is used, its required applicable specification, and a statement that the materials comply with the applicable specifications.

B. Shop drawings for steel deck shall include the name of the manufacturer and all physical properties.

C. Metal deck layout shop drawing shall be drawn no smaller than 1/8 inch per one foot and sections showing all edge conditions and conditions around openings, changes in deck direction, shall be clearly detailed drawn to a scale no smaller than three inch per one foot. Welds and crimps as specified herein shall also be detailed on the shop drawings. Shop drawings shall state type of steel and minimum yield point. Shop drawings will not be reviewed without all the above information clearly indicated.

D. No fabrication shall take place until the shop drawings have been reviewed.

E. All welds shall be indicated by AWS "Welding Symbols".

F. The General Contractor shall check the shop drawings and shall indicate in colored pencil his corrections, holes, modifications for the other trades, and necessary field dimensions before forwarding them to the Architect for correction and review.

G. Complete calculations verifying the ability of the deck to support all design loads.

1.06 LEED SUBMITTALS

A. This subcontractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator for submission to LEED-Online: https://leedonline.usgbc.org. Refer to Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS for all requirements; and Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.07 TESTING AND INSPECTION

A. Inspection, Testing, and Quality Control:

1. 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 initial inspection and testing shall be borne by the Owner. This subcontractor shall be responsible for all costs related to re-inspection or retesting of work identified or proven to be defective.

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 General 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.

1.08 GUARANTEE

A. The General Contractor shall furnish to the Owner a written guarantee covering all defects in materials and workmanship of the work of this Section that occur within a period of one year from the date of final completion of the building. Should any defects in materials or workmanship develop within this time, all necessary repairs and replacements shall be made at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. All steel is to consist of a minimum of 95 percent recycled steel with over 80 percent post-consumer and 15 percent pre-consumer recycled products as defined in the USGBC LEED for Schools v4 credit descriptions.

B. Metal roof deck shall be one of the following with gage as shown on the drawings.
   1. Type B, wide rib, 1-1/2 inch deep, 36 inches wide galvanized sheet carbon steel conforming to ASTM A653, Grade 40 with a minimum yield point of 40,000 PSI
   2. Type NS, wide ribbed, three inch deep, 24 inches wide galvanized sheet carbon steel conforming to ASTM A653, Grade 40 with a minimum yield point of 40,000 PSI
   3. Type NSA, wide ribbed, three inch deep, 24 inches wide, galvanized sheet carbon steel conforming to ASTM A653, Grade 40 with a minimum yield point of 40,000 PSI Webs shall be perforated and filled with acoustic batts that fit into ribs. Minimum noise reduction coefficient shall be 0.70.
   4. Type NCAS, wide ribbed, three inch deep, 24 inches wide, galvanized sheet carbon steel conforming to ASTM A653, Grade 40 with a minimum yield point of 33,000 PSI Top panel shall be Type N and the bottom panel shall be flat and perforated. Acoustic batts shall be factory installed within the cells. Minimum noise reduction coefficient shall be 0.90.
   5. Type 2.0CFDCA, two inch deep, 24 inches wide galvanized sheet carbon steel conforming to ASTM A653, Grade 40 with a minimum yield point of 33,000 PSI Top panel shall be composite floor deck and the bottom panel shall be flat and perforated. Acoustic batts shall be factory installed within the cells. Minimum noise reduction coefficient shall be 0.75. Deck shall be formed with deformations to provide a mechanical lock between concrete and steel.
   6. Type 3.0CFDCA, three inch deep, 24 inches wide galvanized sheet carbon steel conforming to ASTM A653, Grade 40 with a minimum yield point of 33,000 PSI Top panel shall be composite floor deck and the bottom panel shall be flat and perforated. Acoustic batts shall be factory installed within the cells. Minimum noise reduction coefficient shall be 0.85. Deck shall be formed with deformations to provide a mechanical lock between concrete and steel.

C. Floor deck shall be one of the following with gage as shown on the drawings:
   1. Floor deck shall be composite wide rib two inch deep sheet carbon, galvanized conforming to ASTM A1008 or A653 with a minimum yield point of 40,000 PSI Deck shall be formed with deformations to provide a mechanical lock between concrete and steel.
   2. Floor deck shall be composite wide three inch deep sheet carbon, galvanized conforming to ASTM A1008 or A653 with a minimum yield point of 40,000 PSI Deck shall be formed with deformations to provide a mechanical lock between concrete and steel.
   3. Floor form deck shall be nine-sixteenths (9/16") of an inch deep; UFS type sheet galvanized corrugated steel with a minimum yield point of 40,000 PSI

D. Roof deck shall be hot dipped galvanized to ASTM A653 coating, Class G90 with floor deck conforming to ASTM A653 coating, Class G60.

2.02 MATERIAL FABRICATION

A. Decks shall be fabricated to fit about all roof openings. Special 18 gauge edge overlapping pieces with one rib or 18 gauge channel shall be used at all edges, parallel to the span where the deck is continuous, wherever the centerline of a regular rib does not occur within two inch of

the edge. On the sides of all openings, parallel to deck, provide a similar channel or single ribbed piece. Flat bearing must be provided at all edges of the roof and around all openings, so nailers or metal curbs will have solid bearing.

B. All deck shall be shop fabricated to proper lengths and delivered to the job with durable identification corresponding to the shop drawings.

C. Deck shall be fabricated in three span lengths or longer.

D. The General Contractor shall submit complete calculations to the Engineer. Calculations shall verify ability of the deck to support all design loads.

2.03 ACCESSORIES

A. Sixteen Gauge minimum sheet steel closures and cover plates to close panel end conditions where panels end, change direction, or abut.

B. Sheet steel closures for column to close openings between panels and structural steel columns.

2.04 HANDLING AND STORAGE

A. Handle and stack materials carefully in order to prevent deformation or damage during unloading and hoisting, extra care shall be taken to prevent damage to ends and sides of individual panels. If panels are to be stored prior to installation, they shall not be placed in direct contact with ground and shall be protected from elements and dry. If mud, dirt, or other foreign matter is accumulated on panels, such accumulation shall be completely removed prior to erection. All deformed or damaged panels shall be removed from the site and replaced at no additional expense to the Owner.

PART 3 EXECUTION

3.01 ERECTION

A. Metal decking panels and accessories shall be erected and welded in accordance with the manufacturer's specification, for diaphragm action as reviewed on shop drawings, and as specified.

1. NOTE: Penetration through metal decking panels for hangers or hanger attachment devices is prohibited. Do not hang from bare metal roof deck.

B. Metal decking panels shall be shipped to the field cut to the proper length. All notching at column bevel cuts or other similar fabrication shall be performed by metal decking erector.

C. No ducts, conduits, pipes or any other mechanical, electrical, fire protection or plumbing equipment shall be supported from the metal deck.

D. Holes and openings, which are located and dimensioned on the structural drawings, shall be cut by the metal decking erector. Holes required for work by other trades will be located and cut by the respective trades. All openings cut in the metal deck panels shall be reinforced by the metal deck supplier. No opening shall be cut in metal decking panels unless shown on the structural drawings.

E. All cutting of metal decking panels shall be performed in a workmanlike fashion by power shears, gas-torch cold chisel, or other means reviewed by the Architect.

F. Metal decking panels shall be placed on support steel and accurately aligned to final position before being permanently fastened. All metal roof deck panels shall have a minimum bearing of 2 in. on the supporting steel.

G. If the supporting steel framework is not in proper alignment, or at the proper level, the metal decking erector shall notify the General Contractor for corrective action. The metal decking panels shall not be installed until the necessary corrections have been made.

H. Metal decking panels shall rest tightly on the flange of beams or girders of any other support surfaces.

I. Steel Decking shall be fastened to all supporting steel members as follows and as shown on the structural drawings:

1. 1 1/2 inch Deep Deck:
   a. Field: 5/8 inch diameter round spot welds to steel supports at each rib, six inch on center;
   b. Perimeter: 5/8 inch diameter round spot welds to steel supports at six inch on center;
   c. Openings: 5/8 inch diameter round spot welds to steel supports at six inch on center;
   d. Corners: one 3/4 inch diameter round spot weld to steel supports;
   e. Sidelaps: No. 10 TEK screws at one foot on center at sidelaps between supports.
2. Three inch Deep Deck:
   a. Field: 5/8 inch diameter round spot welds to steel supports at each rib, eight inch on center
   b. Perimeter: 3/4 inch diameter round spot welds to steel supports at eight inch on center
   c. Openings: 3/4 inch diameter round spot welds to steel supports at eight inch on center
   d. Corners: two each 3/4 inch diameter round spot welds to steel supports
   e. Sidelaps: No. 10 TEK screws at one foot on center at sidelaps between supports.
3. Two inch and three inch Deep Composite Deck:
   a. Field: 5/8 inch diameter round spot welds to steel supports at each rib, 12 inch on center
   b. Perimeter: 5/8 inch diameter round spot welds to steel supports at 12 inch on center
   c. Openings: 5/8 inch diameter round spot welds to steel supports at 12 inch on center
   d. Corners: one each 5/8 inch diameter round spot welds to steel supports;
   e. Sidelaps: No. 10 TEK screws at two foot on center or closer to support wet concrete and construction loads at sidelaps between supports.
4. Spot welds shall be fully joined all around to the deck. After welding, all roof deck welds shall be painted with ZRC Cold Galvanizing Compound.

J. After welding all roof deck, welds shall be painted with ZRC cold galvanizing compound.

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Design, engineer, furnish and install a complete cold-formed metal structural system as indicated on the Drawings (both Architectural and Structural) and as specified herein, including but not limited to the following:
   1. Engineered light gage framing for exterior stud walls.
   2. Light gage closure and fastening pieces as detailed.
   3. Engineered light gage framing for interior partitions backing up interior masonry veneer (lateral load-bearing).
   4. Light gage framing for suspended acoustical clouds.
   5. Interior and exterior work where 16 gage (or heavier) CFMF, LGM, or LGMF is indicated.
   6. Backup framing for rooftop equipment screens.
   7. Other light gage pieces or framing indicated or required and not listed above.

B. Formed steel stud exterior wall framing.

C. Work being installed by this Section, but furnished from other sections include:
   1. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors securing the work of this section.
   2. Section 04 20 00 - Unit Masonry: Placement of anchors securing the work of this section.

1.02 DEFINITIONS

A. General: See AISI S240 for definitions of terms used in this section.

B. Connection: A combination of structural elements and joints used to transmit forces between two or more members.

C. Connector: A device used to transmit forces between cold-formed steel structural members or between a cold-formed steel structural member and another structural element.

1.03 ABBREVIATIONS AND ACRONYMS

A. AISI. American Iron and Steel Institute; www.steel.org.

B. ASCE. American Society of Civil Engineers; www.asce.org/.

C. ASTM. ASTM International; www.astm.org

D. CMR. Massachusetts State Building Code; ww.mass.gov.

E. ICC. International Code Council; www.iccsafe.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. 780 CMR - Massachusetts State Building Code.

C. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members.

D. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing.

E. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

F. ASCE 7-10 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

H. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

I. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.

J. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.

K. ICC (IBC) - International Building Code.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination, and as follows:

1. In addition to wall framing required to resist code defined loads, coordinate additional framing and blocking required for anchoring Precast Concrete, Cast Stone Masonry, and Unit Masonry products being installed by Division 4.

B. Scheduling and Sequencing per Section 01 32 16 - Construction Progress Schedule, and as follows:

1. Coordinate with work of other sections that is to be installed in or adjacent to metal framing systems, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.
2. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by affected installers.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals:

1. Product Data:
   a. Provide data on cold-formed steel structural members; include material descriptions and base steel thickness.
   b. Provide manufacturer's data on factory-made connectors and mechanical fasteners, showing compliance with requirements.
   c. For lateral-force resisting systems, provide product data sheets on hold-down, showing compliance with requirements.
2. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
   a. Describe method for securing studs to tracks and for bolted framing connections.
   b. Provide design engineer's stamp on Shop Drawings, stamped by a professional structural engineer licensed in Massachusetts.
   c. Provide details and calculations for factory-made framing connectors, stamped by a professional structural engineer licensed in Massachusetts.
   d. Provide elevations of all walls with overall dimensions, and dimensions of all openings.
3. Submit letter from design engineer documenting field observations of the installation-in-progress and acceptance of the completed installation.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
   a. Include documentation of:

1) Post-Consumer and Pre-Consumer Recycled Content.
2) Environmental Product Declarations (EPD).

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Submit, prior to request of Certificate of Occupancy, to both Architect and local Building Official having jurisdiction the following:
a. Final letter of acceptance from the design engineer submitted as soon as practically possible upon completion of framing installation.

1.07 QUALITY ASSURANCE

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Designer Qualifications: Design framing system under direct supervision of a professional structural engineer experienced in designing this work and licensed in Massachusetts.

1.08 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes the work of this section.
1. See Section 01 40 00 - Quality Requirements for exterior building envelope mock-up requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements, for additional requirements.
B. Deliver materials and products in factory labeled packages.
C. Store and handle in strict compliance with manufacturer's instructions and recommendations.
D. Protect from all possible damage.
E. Sequence deliveries to avoid delays, but minimize on-site storage.

PART 2 PRODUCTS

2.01 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 Architect-approved equal:
1. Structural Framing: Subject to compliance with these specifications, provide products of one of the following:
a. ClarkDietrich: www.clarkdietrich.com/#sle.
b. MarinoWARE: www.marinoware.com/#sle.
c. Steel Elements International LLC: www.steelelements.com.
d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 FRAMING SYSTEM

A. Design Requirements: Design cold-formed framing systems, components and connectors to withstand specified design loads in compliance with applicable state and local building codes, ICC (IBC), ASCE 7-10, AISI S100, and AISI S240.
B. Regulatory Requirements: Comply with applicable building code criteria for loads, including seismic loads.
1. Design Criteria: In accordance with applicable codes.
a. Wind Loads: As indicated on Structural drawings.
2. Live load deflection meeting the following, unless otherwise indicated:
a. Exterior Walls: Maximum horizontal deflection under wind load of 1/180 of span.

b. Design nonaxial loadbearing framing to accommodate not less than 1/2 in vertical deflection.

3. Seismic Criteria: Comply with ASCE 7 and with local authorities having jurisdiction:
   a. Site Class: As indicated on Structural drawings.
   b. Seismic Design Category: As indicated on Structural drawings.
   c. Seismic Importance Factor: As indicated on Structural drawings.
4. Able to tolerate 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.
5. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.

2.04 STRUCTURAL FRAMING COMPONENTS

A. Wall Studs and Track Sections: AISI S240; c-shaped studs and u-shaped track sections in stud-matching nominal width and compatible height.
   1. Thickness and Depth: Depth as indicated on the drawings; thickness and structural grade required to meet design criteria.

2.05 LATERAL FORCE-RESISTING SYSTEMS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
   1. Structural Grade: To meet design criteria.

2.06 CONNECTIONS

A. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
   1. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.

2.07 MISCELLANEOUS CONNECTIONS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized per ASTM A153/A153M.

B. Welding: Comply with AWS D1.1/D1.1M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Verify that substrate surfaces are ready to receive work. Verify that air barrier materials are in place at bearing surfaces prior to installing runner tracks.
   2. Verify field measurements and adjust installation if required.
   3. Carefully examine installation areas for compliance with requirements affecting work performance.
      a. Verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are within acceptance requirements of the manufacturer, and ready to receive work.
      b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION - GENERAL

A. Install structural members and connections in compliance with ASTM C1007.

3.03 INSTALLATION OF STUDS

A. Install wall studs plumb and level and in accordance with Drawings, Specifications, and approved shop drawings.
   1. Squarely set studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom tracks. Space studs as indicated on shop drawings; not more than two inches from abutting walls and at each side of openings.
   2. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
   3. Install load-bearing studs full length in one piece. Splicing of studs is not permitted.
   4. Install load-bearing studs; brace, and reinforce to develop full strength and achieve design requirements.
   5. Install intermediate studs above and below openings to align with wall stud spacing.
   6. Provide deflection allowance in stud track, directly below horizontal building framing at non-loadbearing framing. Install double deep leg defection track or specified clip system for vertical deflection of primary building structure.
   7. Attach cross studs to studs for attachment of fixtures anchored to walls.
   8. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
   9. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
   10. Touch-up field welds and damaged corrosion-protected surfaces zinc-rich paint in compliance with ASTM A780/A780M.

3.04 TOLERANCES

A. The following allowable installed tolerances are allowable 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 align: 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.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Manufacturer's design engineer will visit site to inspect installation at 50 percent and 100 percent completion of work.
   1. Prepare and submit written report documenting acceptance of installed work or remedial actions to be executed.

C. Remove, repair and reinstall, or restore-in-place damaged items prior to application of sheathing or other materials of work of this section.
   1. Replace damaged materials and components with new if repair not acceptable to Architect

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Degrease studs if required, and as recommended by manufacturer and meeting Project requirements.

3.07 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 TRADE BID CONTRACT REQUIRED

A. The work of this Trade Bid section shall be included in the Miscellaneous Metals Trade Bid. See Section 05 00 01 - Miscellaneous Metals Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Designing, fabricating, furnishing and/or installation of metal fabrications shown on drawings and specified herein, including but not limited to iron and steel shapes, plates, bars, strips, tubes, angles, castings, lintels, pipe, ladders, trench covers and frames, stair nosings, and other fabricated items specified herein or by specific reference to other sections. See below for requirements:

1. Fabricate, furnish, deliver, erect, and install:
    a. Top of wall lateral bracing for masonry partitions.
    b. Steel lintels supported only at one end on structural steel members.
    c. Column covers.
    d. Column cover plates.
    e. Mesh enclosures and swing gates at roof access stairs.
    f. Steel frames at overhead doors.
        1) Steel frames, interior and exterior corner guards, and neoprene pads.
    g. In-wall steel support for coiling doors, grilles, and horizontal security grilles.
    h. Interior millwork bench supports.
    i. Metal grate ships ladders and landings for stairs to roof.
    j. Protective enclosures for gymnasium short-throw projectors.
    k. Egress gate.
    l. Straps, anchors, plates, bolts, shims, and all other items required for building in or anchoring all items included in items above.
    m. Supports for folding partitions.
2. Fabricate, furnish, and deliver:
    a. Loose steel lintels for openings in masonry walls and partitions; furnish to Masonry Trade Contractor for installation.
    b. Galvanized steel pipe bollards: furnish to site work Contractor for installation. Field painting by Painting Trade Contractor.
    c. Pit Covers and Frames: supply frames to Section 03 30 00 - Cast-in-Place Concrete Contractor for integration into concrete slab-on-grade. Covers and accessory items to be installed following completion of frames by the Misc. Metals Trade Contractor.
    d. Metal fabrications for installation in concrete work, including embedded galvanized steel angles at edges of concrete slabs.
    e. Straps, anchors, plates, bolts, shims, and all other items required for building in or anchoring all items included in items above.
3. Design, fabricate, furnish, deliver, erect and install:
    a. Elevator pit ladder.
    b. Elevator doors sill angle supports.
    c. Metal grate ships ladders.
    d. Fixed manufactured exterior ladders and supports.
    e. Supports for divider curtains and basketball goals at gymnasium.

f. Battens for climbing ropes at gymnasium.
g. Supports for occupational and physical therapy equipment.
h. Auditorium catwalk and all appurtenances; including but not limited to, supports, bracing, railings.
i. Metal floor gratings and plates, and associated components. See Section 05 53 05 - Metal Gratings and Floor Plates
j. Steel support framing for acoustic wall panels at locations indicated on drawings.
k. Light steel support framing for wood panel ceilings at locations indicated on drawings.
l. Steel support framing for operable partitions.
m. Support framing for ceiling-recessed projection screens at locations indicated on drawings.
n. Frame, hardware, and all other components required for gates at dumpster enclosure, except the posts (listed above for installation by Construction Manager and metal siding (to be furnished and installed by Construction Manager).
o. Straps, anchors, plates, bolts, shims, and all other items required for building in or anchoring all items included in items above.

4. Shop painting. Field touch up shall be included.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association; www.aamanet.org.
B. ANSI. American National Standards Institute; www.ansi.org.
C. ASTM. ASTM International; www.astm.org
D. AWS. American Welding Society; www.aws.org
E. FS. Federal Specifications, Standards and Commercial Item Descriptions; U.S. General Services Administration; www.gsa.gov.
F. IAS. International Accreditation Service; iasonline.org.
G. OSHA. Occupational Safety and Health Administration: www.osha.gov.
H. SSPC. The Society for Protective Coatings; www.sspc.org/standards/scopes.html

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AAMA 611 - Specification for Anodized Architectural Aluminum.
C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
D. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements.
E. ASTM A27/A27M - Standard Specification for Steel Castings, Carbon, for General Application.
F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
G. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.
H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
I. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
J. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
K. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

L. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
M. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
N. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
O. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
P. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire.
Q. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings.
R. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings.
S. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
T. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
U. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
V. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
W. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.
X. AWS D1.1/D1.1M - Structural Welding Code - Steel.
Y. AWS D1.2/D1.2M - Structural Welding Code - Aluminum.
Z. FS FF-B-561 - Bolts, (Screw), Lag; Federal Specifications.
AA. FS FF-B-588 - Bolt, Toggle: and Expansion Sleeve, Screw; Federal Specification.
BB. FS FF-S-92 - Machine Screws; Federal Specification.
CC. FS FF-S-111 - Screw, Wood; Federal Specification.
DD. FS FF-S-325 - Shield, Expansion; Nail Expansion, and Nail, Drive Screw (Devices, Anchoring, Masonry); Federal Specification.
EE. FS FF-W-84 - Washers, Lock (Spring); Federal Specification.
FF. FS FF-W-92 - Flat Washers; Federal Specification.
GG. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172.
HH. OSHA 1910.23 - Walking-Working Surfaces.
II. OSHA 1910.29(b) - Fall protection systems and falling object protection - criteria and practices, Guardrail systems.
JJ. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
KK. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).
LL. SSPC-SP 1 - Solvent Cleaning.
MM. SSPC-SP 2 - Hand Tool Cleaning.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals:
   1. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

a. Stamped engineered drawings and calculations for items indicated to be designed (noted previously):
   1) Submit design drawings and engineering calculations stamped by a structural engineer licensed in the State of Massachusetts, proving compliance with MSBC (780 CMR) requirements.

2. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
3. Lead-free Certification: Statement certifying that all galvanizing and welding solders used are lead free.
4. Fabricator's Qualification Statement.
5. Designer's Field Inspection Affidavit: submit affidavit that work in place has been inspected by the designer and executed in conformance with design and engineering. Submit as soon as possible following completion of installation.

C. Sustainability Submittals:
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Miscellaneous Metals Trade Contractor shall provide all documentation indicating applicability of products of this section to potential LEED credits to the project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
   a. Include documentation of:
      1) Post-Consumer and Pre-Consumer Recycled Content.
      2) Environmental Product Declarations (EPD).

1.06 QUALITY ASSURANCE

A. Fabricator: A company specializing in manufacturing products specified in this section, with not less than five years' documented experience in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Certifications:
1. Galvanizing: Lead-free
2. Welding Solder: Lead-free

C. Take field measurements prior to preparation of Shop Drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting wherever taking of field measurements before fabrication might delay work.

D. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only when necessary for shipping and handling limitations. Clearly mark units for reassembly, and to coordinate installation.

E. The Construction Manager shall maintain records of test results of welding procedures and records of welders employed, date of welder qualification, and identification symbol or mark. Such records shall be available for examination by the Structural Engineer of Record (SER) and Testing Agency or certified copies submitted upon request to the SER and the Testing Agency.

F. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

G. Provide ladders complying with all OSHA regulations applicable to fixed ladders and ladder safety systems, including but not limited to OSHA 1910.23 and OSHA 1910.29(b).

1.07 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes the work of this section.
   1. See Section 01 40 00 - Quality Requirements for exterior building envelope mock-up requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements, for additional requirements.
B. Comply with manufacturer's instructions and recommendations.
C. Mark products with Shop Drawing location reference, unless already properly marked.
   1. Use removable tags or concealed markings.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements and Submittal instructions.
   1. All materials and work of this section fabricated by a manufacturer shall be covered by the manufacturer’s standard warranty but not for less than required by the conditions of the Contract and general requirements.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.
B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
C. Plates: ASTM A283/A283M.
D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.
F. Slotted Channel Fittings: ASTM A1011/A1011M.
G. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
   1. Masonry Anchors: Expansion shield, FS FF-S-325.
   2. Lag Bolts: Square head type, FS FF-B-561.
   3. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
   4. Machine Screws: Cadmium plated steel, FS FF-S-92.
   5. Wood Screws: Flat Head carbon steel, FS FF-S-111.
   6. Plain Washers: Round carbon steel, FS FF-W-92.
   7. Lock Washers: Helical spring-type carbon steel, FS FF-W-84.
   8. Neoprene Washers.
   9. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style to fit application.
   10. Type 304 stainless steel, injection adhesive anchors. AISI 304 or AISI 326 meeting requirements of ASTM F593 (condition CW).
   11. Certified rated steel screw pin shackles.
   12. Any fasteners used to fasten to galvalume metal shall be type 304 stainless steel and shall have a neoprene washer or other neutral material between dissimilar metals to prevent corrosion.
H. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
I. Concrete Inserts: Threaded or wedge type, galvanized ferrous castings either malleable iron ASTM A47/A47M or cast steel ASTM A27/A27M.

J. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

K. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
   1. Product: IronClad Retardo Rust Inhibitive Paint 163, or an Architect-acceptable equivalent product subject to compliance with requirements.

L. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction and LEED requirements.
   1. Product: IronClad Galvanized Metal Latex Primer 363, or an Architect-acceptable equivalent product subject to compliance with requirements.

M. Finishes:
   1. Galvanizing for Steel Shapes: ASTM A123/A123M.
   2. Galvanizing for Steel Hardware: ASTM A153/A153M.

N. All ferrous metals exposed to weather and all ferrous metals to be located in apparatus bays, workshops and similar utility spaces, locker rooms, kitchen, and mechanical rooms, and where indicated shall be hot-dip galvanized after fabrication and factory primed with a primer compatible with and recommended by the manufacturer of the galvanizing coating and process. Application procedures shall be in accordance with manufacturer's instructions and recommendations to meet the specified ASTM standards.

2.02 MATERIALS - ALUMINUM

A. Except where specifically noted otherwise, aluminum materials shall comply with the following:
   1. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
   2. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.
   3. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.
   4. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.
   5. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
   6. Aluminum-Alloy Die Castings: ASTM B85/B85M.
   7. Bolts, Nuts, and Washers: Stainless steel.
   8. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by intermittent welds and plastic filler.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

A. All fabricated items shall be made using acceptable materials listed above and as shown on drawings (including Structural Drawings).

B. Aluminum Column Covers
   1. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required.

2. Stiffeners: Panel stiffeners shall be structurally fastened or restrained at the ends and shall be secured to the rear face of the formed metal fabrication with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.
3. Fasteners: Provide self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners.
    a. Exposed Fasteners: Stainless steel, or as recommended by formed metal fabrication manufacturer.
    b. Concealed Fasteners: stainless steel, or as recommended by system manufacturer
4. System Brake Metal: Provide 0.063 inch (1.60 mm) minimum thickness aluminum sheet; where exposed, painted to match adjacent metal framing or formed metal fabrication.
5. Anchors and Inserts: Provide type, size, and material required for loading and installation indicated. Use non-ferrous metal or hot dip galvanized anchors and inserts for exterior installations and in other locations requiring corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors. Furnish inserts to be set into concrete or masonry work.
6. Fabrication
    a. Form column covers from sheet metal of type and thickness indicated. Incorporate reveals, trim, and concealed anchors, for attachment to columns or adjacent construction as indicated. Provide units of size and configuration shown. Column covers shall be formed in shape shown on drawings, with reveals and joints as shown on the drawings. Include structural supports and anchorages. Factory assembles units complete, ready for field installation.
    b. Horizontal Joint: Base: reveal.
    c. Horizontal Joint: Ceiling, reveal.
    d. Material: Aluminum sheet, Alloy 5005, 0.125 inch (3.2 mm) thick.
    e. Aluminum Finish, Alloy 5005: Clear Anodized finish, applied per AAMA standards, free of scratches and blemishes.
    f. Fabrication: Column covers shall be fabricated on press breaks and roll-forming equipment as shapes require. Provide solid aluminum materials to allow for forming techniques on curves, 3D profiles, and difficult transitions without unsightly splices or joints.
    g. Fold back ends of sheet metal to form a 1 inch (25 mm) wide return leg on the concealed side.
    h. Bump forming of column cover will not be permitted unless prior written acceptance of the Architect.
    i. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise damaging the work.
    j. Provide straps, plates, and brackets for support and anchorage of fabricated items.
    k. Form column cover work to indicated shapes and sizes, with true curves, lines, and angles.
    l. Coordinate dimensions and attachment methods of formed metal fabrications with those of adjoining products and construction to produce integrated assemblies with closely fitting joints, and edges and surfaces aligned with one another in relationship indicated.

C. Column cover plates: Flat galvanized steel plate in thickness indicated on drawings, prime paint finish.

D. Support framing for Gym Divider Curtains, Ceiling-Hung Projection Screens, and Basketball Backstops:

1. Required to be designed by a structural engineer licensed in Massachusetts.
2. May be fabricated from structural steel angles or prefabricated slotted channel framing as manufactured by Unistrut, Powerstrut, or equal). Prime paint finish.
3. All attachment to structural steel roof framing shall be included.

E. Interior and Exterior Ladders: Steel; in compliance with ANSI A14.3 and applicable OSHA requirements; with mounting brackets and attachments; galvanized finish.
1. Unless otherwise shown, provide C4x5.4 continuous structural steel channel side rails with eased edges, spaced 18 inches apart.
2. Rungs: one inch diameter solid round bar spaced 12 inches on center (non-slip finish).
3. Space rungs 7 inches from wall surface.
4. Provide hinged, solid metal security cover with padlock hasp to cover ladder from floor level up to seven feet above floor at interior ladders. Cover to be prime painted.

F. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

G. Loose Lintels: As detailed and to sizes indicated in structural lintel schedule; galvanized finish.

H. Sump pit covers:
1. Aluminum frame specifically designed for casting in to concrete construction.
2. Perforated galvanized steel plate cover with 50 percent free area for attachment to the frame.
3. Trench cover thickness shall resist 200 pounds concentrated load on 2 inch by 2 inch area with deflection limited to 1/8 inch.

Finish

a. Exposed aluminum surfaces shall be mill finish.
b. Aluminum surfaces in contact with concrete shall be prime painted.
c. Galvanized Steel: Galvanized steel surfaces in contact with concrete shall be prime painted.

I. Door Frames for Overhead Door Openings: Channel and Angle sections as detailed; galvanized finish and prime painted.

J. Support framing for OT/PT Swing: as indicated on drawings; prime paint finish

2.05 FINISHES - STEEL

A. Prime paint steel items.
1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specifically indicated to be galvanized.
2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with spray applied fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2. Remove oil, grease and similar contaminants in accordance with SSPC-SP 1 "Solvent Cleaning".

C. Prime Painting: Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions and at a rate to provide uniform dry film thickness of 2.0 mil. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.

D. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I color anodized.

B. Interior Aluminum Surfaces: Class I natural anodized.

C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

D. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system; color as indicated.
E. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.07 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.
B. Maximum Offset Between Faces: 1/16 inch.
C. Maximum Misalignment of Adjacent Members: 1/16 inch.
D. Maximum Bow: 1/8 inch in 48 inches.
E. Maximum Deviation from Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.
B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
C. Comply with design engineer's anchoring and fastening requirements.
D. Field weld components as indicated on drawings.
E. Perform field welding in accordance with AWS D1.1/D1.1M.
F. Obtain approval prior to site cutting or making adjustments not scheduled.
G. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.05 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

3.06 TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset from True Alignment: 1/4 inch.
C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 51 00
METAL STAIRS

PART 1 GENERAL

1.01 TRADE CONTRACT REQUIRED

A. The work of this section shall be included in the Miscellaneous Metals Trade Bid. See Section 05 00 01 - Miscellaneous Metals Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Shop fabricated steel stairs design engineered, fabricated, primed, delivered, furnished, and installed with the following items.
   1. Stairs with cast-in-place concrete treads and landings.
   2. Stairs with precast concrete treads and cast-in-place concrete landings.
   3. Stairs with open grate metal treads and landings.
   4. Structural steel stair framing and supports. Including landings and integral supports, except where landings or supports are specifically indicated on the Structural Drawings.
   5. Handrails and guards, as specified in Section 05 52 13 - Pipe and Tube Railings.
   6. Accessories required for a complete installation.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.
B. AWS. American Welding Society: www.aws.org.
C. IAS. International Accreditation Service: www.iasonline.org.
D. SSPC. The Society for Protective Coatings: www.sspc.org/standards/scopes.html.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
F. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.
G. AWS D1.1/D1.1M - Structural Welding Code - Steel.
H. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172.
I. SSPC-SP 2 - Hand Tool Cleaning.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Shop Drawings: Indicate profiles, field measurements, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, finishes, and accessories.
      a. Include the seal and signature on each sheet of shop drawings, of a structural engineer licensed in the State of Massachusetts.

b. Submit design engineer's inspection report at 50 percent completion of construction, accepting work or describing remedial action to be completed.
c. Design Data: Per requirements of authorities having jurisdiction.

2. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
3. Designer's Qualification Statement.
4. Fabricator's Qualification Statement.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Miscellaneous Metals Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Submit design engineer's site inspection and documentation of final acceptance of completed work as soon as practical upon completion of metal stair work.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: A company specializing in manufacturing products specified in this section, with not less than five years' documented experience in producing products similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
B. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in Massachusetts, or personnel under direct supervision of such an engineer.
C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.
D. Design Engineer's Field Reports:
1. The design engineer shall visit the site to inspect the work in progress at approximately 50 percent completion, and provide a field report stating that the work in place is being installed in conformance with design details, or listing actions to be taken to correct deviations from the design.
2. The design engineer shall visit the site after all stair installation is complete, but before installation of adjacent work conceals connections or components of the installation to verify that the work has been completed in conformance with the design and shop drawings.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements, for additional requirements.
B. Mark products with Shop Drawing location reference, unless already properly marked.
1. Use removable tags or concealed markings.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.
   2. Dimensions: As indicated on drawings.
   3. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   4. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   5. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:
   1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
      a. Welded Joints: Continuously welded and ground smooth and flush.
      b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
      c. Exposed Edges and Corners: Eased to small uniform radius.
      d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
   2. Industrial: All joints shall be made neatly.
      a. Welded Joints: Welded on back side wherever possible.
      b. Welds Exposed to Touch: Ground smooth.
      c. Bolts Exposed to Touch in Travel Area: No nuts or screw threads exposed to touch.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Architectural, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.
   1. Concrete Depth: 1-1/2 inches, minimum.
   2. Tread Pan Material: Steel sheet.
   3. Tread Pan Thickness: To meet design requirements; 12 ga minimum.
   4. Pan Anchorage to Stringers: Welded or bolted to carrier angles welded or bolted to stringers.
   5. Concrete Reinforcement: Welded wire mesh.
   6. Concrete Finish: For resilient floor covering.

D. Risers: Same material and thickness as tread pans.
   1. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.
   2. Nosing Depth: Not more than 1-1/2 inch overhang.
   3. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.

E. Stringers: Rolled steel channels.
   1. Stringer Depth: 10 inches.
   2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Intermediate Landings: Same construction as treads, supported and reinforced to support design load capacity.
G. Finish: Shop- or factory-prime painted.
H. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.03 MONUMENTAL STAIR METAL PERFORATED STAIR RISERS

A. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. McNichols Company; Bar Grating GW-100; www.mcnichols.com
   2. Indiana Gratings Inc.; www.indianagratings.com
   3. Interstate Gratings; www.interstategratings.com
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
B. Locations: As indicated on Drawings.
C. Bar Size: 1 inch wide by 3/16 inch thick.
D. Bar Spacing: 19-W-4.
E. Perforation Pattern: 70 percent (minimum) open.
F. Materials: Stainless steel.

2.04 HANDRAILS AND GUARDS

A. Wall-Mounted Rails: As specified in Section 05 52 13 - Pipe and Tube Railings.
B. Guards: Pipe railings, see Section 05 52 13.

2.05 MATERIALS

A. Steel Sections: ASTM A36/A36M.
B. Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.
C. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
   1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
   2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
D. Concrete Fill: Type specified in Section 03 30 00 - Cast-in-Place Concrete.
E. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.06 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
B. Do not prime surfaces in direct contact with concrete or where field welding is required.
C. Prime Painting: Use specified shop- and touch-up primer.
   1. Preparation of Steel: In accordance with SSPC-SP 2 Hand Tool Cleaning.
   2. Number of Coats: One.
D. Field Finish: Provided by Sections 09 91 13 - Exterior Painting and 09 91 23 - Interior Painting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions per Section 01 40 00 - Quality Requirements, and as follows:
B. Carefully examine installation areas with installer present, for compliance with requirements affecting work performance.

1. Verify that field measurements, surfaces, substrates, structural support, anchor inserts, tolerances, levelness, plumbness, cleanliness, and other conditions are required by the fabricator, and ready to receive work.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Provide/include structural support of all landings and stringers where support is not shown in Structural Drawings.

3.02 PREPARATION

A. When field welding is required, clean and strip primed steel items to bare metal.

3.03 INSTALLATION

A. General: Install metal stairs according to the drawings, specifications, submittals, manufacturer's instructions, MSBC (780 CMR), and as follows:
1. Install components plumb and level, accurately fitted, free from distortion or defects.
2. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
3. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
4. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
5. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
6. Obtain approval prior to site cutting or creating adjustments not scheduled.
7. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset from True Alignment: 1/4 inch.

3.05 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
1. Touch-up damaged shop-applied primer.
2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.07 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 05 52 13
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Miscellaneous Metals Trade Bid. See Section 05 00 01 - Miscellaneous Metals Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Designing, fabricating, delivering, erecting and installing the following work:
   1. Interior and exterior wall mounted stainless steel and galvanized painted steel handrails.
   2. Interior stair railings and guardrails of steel construction with stainless steel handrail grip surfaces, shop primed.
   3. Free-standing interior and exterior railings at steps.
   4. Manufactured roofgard railing system at roof edges.
   5. Accessories for a complete installation, including but not limited to fasteners, anchors, and mounting plates.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASCE. American Society of Civil Engineers; www.asce.org.
B. ASTM. ASTM International; www.astm.org.
C. AWS. American Welding Society; www.aws.org
D. NAAMM. National Association for Architectural Metal Manufacturers; www.naahm.org.
E. OSHA. Occupational Safety and Health Administration: www.osha.gov.
F. OTC. Ozone Transport Commission; www.otcair.org.
G. SSPC. The Society for Protective Coatings; www.sspc.org/standards/scopes.html

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
F. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes.
G. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
I. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
J. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
K. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.
L. AWS D1.1/D1.1M - Structural Welding Code - Steel.
M. NAAMM AMP 521 - Pipe Railing Systems Manual, Including Round Tube.
N. OSHA 1910.23 - Walking-Working Surfaces.

O. OSHA 1926.500-1926.503 - Fall Protection.
P. OTC Model Rule, AIM - Architectural, Industrial, and Maintenance Coatings.
Q. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).
R. SSPC-SP 10 - Near-White Metal Wet Abrasive Blast Cleaning.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Drawings shall be stamped or sealed by a structural engineer licensed in the State of Massachusetts.
      a. Include erection drawings, layout, field measurements, elevations, anchorage and details.
      b. Include the design engineer's stamp or seal on each sheet of shop drawings.
   2. Delegated Design Data: Submit design details and calculations prepared by design engineer.
   3. Submit design engineer's inspection report at 50 percent completion of construction, accepting work or describing remedial action to be completed.
   4. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.
   5. Fabricator's Qualification Statement.
   6. Installer's Qualification Statement.
   7. Samples:
      a. Submit three samples of welded wire fabric guard infill, not less than 12 inches by 12 inches in size.
      b. Submit one fabricated sample of guard construction consisting of infill assembled into frame and round pipe sections demonstrating joint tolerances and appearance of finished assembly.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Miscellaneous Metals Trade Contractor shall provide all documentation indicating applicability of products of this section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.
         2) Environmental Product Declarations (EPD).
D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Submit design engineer's site inspection and documentation of final acceptance of completed work as soon as practically possible upon completion of railing installation.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications:

1. A company specializing in manufacturing products specified in this section, with not less than five years' documented experience in producing products similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Installer Qualifications:
   1. Installer Qualifications: Company specializing in performing work of type specified and with at least three years' documented experience.

C. Welder Qualifications: Pipe and tube welders qualified in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

D. Sustainability Standards Certifications:
   1. VOC Requirements: Field-applied primer, touch-up primer, and other coating products shall meet project's sustainability goals, see Section 01 81 13 - Sustainable Design Requirements and OTC Model Rule, AIM.
      a. Cleaning materials used in interior spaces shall be low VOC and contain no Toxic / Hazardous Air Pollutants (HAP).
   2. Welding Solder: Lead-free.

1.07 MOCK-UPS

A. Provide prototype mock-ups as follows:
   1. Provide materials and full or partial assemblies of each unit type for review and approval prior to fabrication production indicating each different:
      a. Bends, angles, and joint connections showing welds and exposed fasteners.
      b. Supports and accessories.
      c. Finish system.
   2. Accepted mock-up may become a benchmark installation to remain in place as part of the finished work.
   3. See Section 01 40 00 - Quality Requirements for additional information pertaining to mock-ups.

1.08 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements, for additional requirements.

B. Comply with manufacturer's instructions and recommendations.

C. Mark products with shop drawing location reference, unless already properly marked.
   1. Use removable tags or concealed markings.

1.09 WARRANTY

A. Manufacturer / Special Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
   1. Manufactured Guardrail System: Provide written two year material warranty issued by the manufacturer upon completion of the work and beginning on the date of Substantial Completion.

PART 2 PRODUCTS

2.01 DESCRIPTION - RAILINGS

A. Regulatory Requirements: Design engineer, fabricate, and test railing assemblies in accordance with the most stringent requirements of NAAMM AMP 521, ASTM E935, ADA, State's Access Rules, and State's Building Code.
   1. Guardrails for fall protection shall also be in accordance with OSHA 1910.23 and OSHA 1926.500-1926.503.

2.02 PERFORMANCE / DESIGN CRITERIA

A. Engineer railing assembly, wall rails, and attachments to resist lateral force required by building code at any point without damage or permanent set. Test in accordance with ASTM E935.
   1. Handrails and guards shall be designed to resist a linear load of 50 pounds per linear foot (plf) (0.73 kN/m) in accordance with Section 4.5.1 of ASCE 7.
   2. Handrails and guards shall also be designed to resist a concentrated load of 200 pounds (0.89 kN) in accordance with Section 4.5.1 of ASCE 7.
   3. Intermediate rails (all those except the handrail), balusters and panel fillers shall be designed to resist a concentrated load of 50 pounds (0.22 kN) in accordance with Section 4.5.1 of ASCE 7.

B. Allow for expansion and contraction of members and building movement without damage to connections or members.

C. Dimensions: See drawings for configurations and heights.
   1. Handrail Grip Rails: 1-5/8 inch outside diameter (nominal) Schedule 40 Type 304 stainless steel pipe.
   2. Top Rails and Wall Rails: 1-1/2 inches inside diameter, round.
   3. Intermediate Rails: 1-1/2 inches inside diameter, round.
   4. Posts: 1-1/2 inches inside diameter, round.
   5. Infill: 1/2 inch square pickets at 4 inches on center spacing in frame.

D. Provide anchors and other components required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

E. Provide slip-on non-weld mechanical fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.03 STEEL RAILING SYSTEM

A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A666/A666M, Type 304

B. Stainless-Steel Bars and Shapes: ASTM A276/A276M, Type 304

C. Stainless Steel Tube: ASTM A312/A312M, Type 304, Seamless and Welded Austenitic Stainless Steel Pipe

D. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

E. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.

F. Steel Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.

G. Wire Mesh: INSERT MESH SIZE stainless mesh.

H. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

I. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

J. Galvanizing: In accordance with requirements of ASTM A123/A123M.
   1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.

2.04 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

2.05 FINISHES - STEEL

A. Handrail Grip Surfaces: Satin finish stainless steel.

B. Exterior guard and railing systems at exterior front entry ramps and stairs as indicated on drawings: stainless steel construction.
C. All other components: Shop-applied primer coat.
   1. Prepare surfaces to be primed in accordance with SSPC-SP 10.
   2. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
D. Field Painting: Provided by Sections 09 91 13 - Exterior Painting and 09 91 23 - Interior Painting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas with installer present, for compliance with requirements affecting work performance.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.
C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

A. Install metal Pipe and Tube Railings according to the drawings, specifications, submittals, fabricator’s / manufacturer's instructions, OSHA requirements, and as follows:
   1. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
   2. Anchor railings securely to structure.
   3. Provide galvanized railings and guards at all exterior work. Repair all damaged galvanizing with galvanizing repair coatings. Degrease galvanized products to leave them prepared to receive paint finishes.
   4. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
   5. Where intermittent "stitch welds" are used, fill gaps between welds with resin-based body filler and sand smooth so that appearance is continuous with welds.
   6. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per floor level, non-cumulative.
B. Maximum Offset from True Alignment: 1/4 inch.
C. Maximum Out-of-Position: 1/4 inch.

3.05 FIELD QUALITY CONTROL

A. Remove, repair and reinstall, or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Replace damaged materials and components with new if repair is not acceptable to Architect.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.07 PROTECTION

A. Protect installed work from subsequent construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 05 53 05
METAL GRATINGS AND FLOOR PLATES

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this Section shall be included in the Miscellaneous Metals Trade Bid. Refer to Section 05 00 01: Miscellaneous Metals Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Formed metal floor gratings and support framing system for elevated floor conditions, including mechanical platforms.

B. Flat surface floor and stair tread plating.

1. Applications:
    a. Elevator pit sump cover.
    b. Stair 4 to Roof.

C. Accessories required for a complete installation, including but not limited to anchors, fasteners, shims, and non-shrink grout.

D. Perimeter closure.

E. Furnish frames and anchors for embedment in concrete to the concrete subcontractor for installation, and coordinate placement with that subcontractor.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.

B. AWS. American Welding Society; www.aws.org.

C. SSPC. Association for Materials Protection and Performance, formerly The Society for Protective Coatings; www.sspc.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.

F. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire.

G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.

I. AWS D1.1/D1.1M - Structural Welding Code - Steel.

J. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).

K. SSPC-SP 2 - Hand Tool Cleaning.

1.05 SUBMITTALS

A. Submit in accordance with Section 01 30 00 - Administrative Requirements.

B. Construction Submittals

1. Product Data: Provide span and deflection tables.
2. Shop Drawings: Indicate details of component supports, openings, perimeter construction details, and tolerances.

a. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
b. Include the design engineer's seal and signature on each sheet of shop drawings.

3. Samples: Submit two samples, 12 by 12 inch in size illustrating surface finish, color, and texture.
4. Delegated Design Data: Submit engineering calculations for all components demonstrating compliance with structural loading requirements of building code prepared by a structural engineer licensed in Massachusetts.
   a. Submit design engineer's inspection report at 50 percent completion of construction, accepting work or describing remedial action to be completed.
5. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.
6. Designer's Qualification Statement.
7. Manufacturer's Installation Instructions: Indicate special requirements for opening and perimeter framing.

C. Sustainability Submittals:
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Miscellaneous Metals Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
   a. Include documentation of:
      1) Post-Consumer and Pre-Consumer Recycled Content.
      2) Environmental Product Declarations (EPD).

D. Closeout Submittals
1. Submit in accordance with the following Sections:
   a. 01 70 00 - Execution and Closeout Requirements.
   b. 01 78 00 - Closeout Submittals
2. Submit design engineer's site inspection and final acceptance of completed work documentation as soon as practically possible upon completion of Metal Stair work.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design gratings and plates under direct supervision of a Professional Structural Engineer experienced in design of this type of work and licensed in Massachusetts.
B. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months in accordance with AWS D1.1/D1.1M.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these specifications, provide products of one of the following:
1. Grating Pacific: www.gratingpacific.com.
2. Indiana Gratings, Inc.: www.indianagratingsinc.com.
3. McNichols Company; Series 11-W-4: www.mcnichols.com. (Basis of Design)
4. SLIPNOT Metal Safety Flooring: www.slipnot.com/#sle.

5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE REQUIREMENTS

A. Design Live (Pedestrian) Load: Uniform load of 100 lb/sq ft minimum; concentrated load of 300 lbs.

B. Maximum Allowable Deflection Under Live Load: 1/240 of span; size components by single support design.

C. Maximum Spacing Between Bars: To comply with applicable barrier free codes and guidelines and to restrict pedestrian shoe heels.

2.03 MATERIALS

A. Steel Floor Plate: ASTM A786/A786M; Pattern No. 5.

B. Steel For Welding or Riveting: ASTM A36/A36M unfinished, of shapes indicated.

C. Cross Bars: ASTM B211/B211M solid bars.

D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, complying with project's LEED requirements and VOC limitations of authorities having jurisdiction.

2.04 ACCESSORIES

A. Fasteners and Saddle Clips: Galvanized steel:

B. Perimeter Closure: Of same material as grating.

2.05 FABRICATION

A. Fabricate grates and plates to accommodate design loads.

B. Fabricate support framing and grating in section sizes to allow for easy removal; individual panels to be 4 ft by 4 ft maximum size.

C. Fabricate support framing for openings.

D. Top Surface: Smooth.

E. Bearing Bar: 3/16 by 1-1/4 inch size, spaced 11/16 inches on center.

F. Maximum Opening: 1/2 inch maximum opening measured in the direction of travel.

G. Cross bars spaced at 4 inches on center.

H. Welded construction.

2.06 FINISHES

A. Prepare surfaces to be primed in accordance with SSPC-SP 2.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

C. Do not prime surfaces in direct contact with concrete or where field welding is required.

D. Prime paint items with two coats.

E. Galvanizing for Steel Shapes: ASTM A123/A123M.

F. Galvanizing for Steel Hardware: ASTM A153/A153M.

G. Non-Slip Surfacing: Aluminum oxide.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Verify that opening sizes and dimensional tolerances are acceptable.

C. Verify that supports are correctly positioned.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions and drawings. Anchor frames to adjacent construction.

B. Place frames in correct position, plumb and level. Fasten to structure.
C. Mechanically cut galvanized finish surfaces. Do not flame cut.
D. Set frame so that top of plate or grating is flush with top of grating and surrounding construction.
E. Secure metal floor plate to frame to prevent movement.

3.03 TOLERANCES

A. Maximum Space Between Adjacent Sections: 1/2 inch.
B. Maximum Variation from Top Surface Plane of Adjacent Sections: 1/8 inch

END OF SECTION

SECTION 05 73 00
DECORATIVE METAL RAILINGS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Miscellaneous Metals Trade Bid. Refer to Section 05 00 01 - Miscellaneous Metals Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Designing, fabricating, delivering, erecting and installing the following work:
   1. Railing systems.
   2. Accessories for a complete installation, including but not limited to: fasteners; anchors; mounting plates.

1.03 ABBREVIATIONS AND ACRONYMS

A. CFR. Code of Federal Regulations; www.ecfr.gov.
B. ADA. Americans with Disabilities Act; www.ada.gov.
C. ASTM. ASTM International; www.astm.org.
D. AWS. American Welding Society; www.aws.org

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
C. ADA Standards - 2010 ADA Standards for Accessible Design.
D. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.
E. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
F. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.
I. AWS D1.1/D1.1M - Structural Welding Code - Steel.
J. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel.
K. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
L. OTC Model Rule, AIM - Architectural, Industrial, and Maintenance Coatings.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.
   2. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
      a. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
      b. Include erection drawings, layout, field measurements, elevations, anchorage and details

c. Include design engineer's stamp or seal and signature on each sheet of shop drawings.

3. Samples: Submit one of each item below for each type and condition shown.
   a. Glass: 12 by 12 inches, showing color, thickness, and edge condition.
   b. Railing: 12-inch long section of each railing member, including top rails and posts; show color, finish, and connection details.
4. Delegated Design Documents: Drawings and calculations sealed by Designer.
5. Test Reports: Submit test reports from independent testing agency showing compliance with specified design and performance requirements.
6. Manufacturer's Instructions: Indicate installation.
7. Designer's qualification statement.
8. Fabricator's qualification statement.
9. Welders' qualification statement.
10. Installer's qualification statement.
11. Specimen warranty.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Miscellaneous Metals Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
   a. Include documentation of:
      1) Post-Consumer and Pre-Consumer Recycled Content.
      2) Environmental Product Declarations (EPD).
      3) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings. Refer to Section 01 81 13 - Sustainable Design Requirements for VOC limits.

D. Closeout Submittals
1. Submit in accordance with the folowing:
   a. Section 01 70 00 - Execution and Closeout Requirements.
   b. Section 01 78 00 - Closeout Submittals.
2. Submit design engineer's site inspection and final acceptance of completed work documentation as soon as practically possible upon completion of railing installation.
3. Maintenance Data: Manufacturer's instructions for care and cleaning.
4. Executed warranty.

1.06 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in Massachusetts or personnel under direct supervision of engineer.

B. Fabricator Qualifications: A company specializing in manufacturing products specified in this section, with not less than five years of documented experience in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Installer Qualifications:

1. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

D. Welder Qualifications: Welding processes and welding operators certified in accordance with AWS B2.1/B2.1M within 12 months of scheduled welding work.

E. Sustainability Standards Certifications:

1. VOC Requirements: Field-applied primer, touch-up primer, and other coating products shall meet project's sustainability goals, see Section 01 81 13 - Sustainable Design Requirements and OTC Model Rule, AIM.
    a. Cleaning materials used in interior spaces shall be low VOC and contain no Toxic / Hazardous Air Pollutants (HAP).
2. Welding Solder: Lead-free.

1.07 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Provide mock-up of railing system including glass guardrail panel with cap and handrail, 4 feet long minimum, indicating each type of material and finishl, and all attachments.

C. Locate where directed by Architect.

D. Accepted mock-up may become a benchmark installation to remain in place as part of the finished work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements, for additional requirements.

B. Deliver materials in factory-provided protective coverings and packaging.

C. Mark products with Shop Drawing location reference, unless already properly marked.

1. Use removable tags or concealed markings.

D. Protect materials against damage during transit, delivery, storage, and installation at site.

E. Inspect materials upon delivery for damage. Replace damaged items.

F. Prior to installation, store materials and components under cover in dry location.

1.09 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F and maximum 95 degrees F.
2. Maintain ambient temperature of space at minimum 65 degrees F and maximum 95 degrees F for 24 hours before, during, and after railing installation.

1.10 WARRANTY

A. Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.

B. Manufacturer's Warranty: Provide anufacturer's written two-year warranty against defects in materials, fabrication, finishes, and installation, issue upon complection of the work of this section and commencing on the date of Substantial Completion; complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Decorative Metal and Glass Railings: Subject to compliance with these specifications, provide products of one of the following:

1. CR Laurence Co; www.crlaurence.com.
2. Livers Bronze, LLC; Ornamental Railing Systems: www.liversbronze.com.
3. Viva Railings, LLC; SHOE Railing System: www.vivarailings.com. (Basis of Design)
4. Wagner Architectural Glass Systems; PanelGrip Railing Collection: www.wagnerarchitectural.com.

5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 RAILING SYSTEMS

A. General: Factory- or shop-fabricated to suit project conditions, for proper connection to building structure, and in largest sizes practical for delivery to site.

B. Performance Requirements:
   1. Comply with ASTM E985.
   2. Comply with ADA Standards.
   3. Structural Requirements: Applying loads simultaneously not required; design and fabricate railings and anchorages to resist loads without failure, damage, or permanent set, including:
      a. Lateral Force: 75 lb minimum, when tested in accordance with ASTM E935.
      b. Distributed Load: 50 lbf/ft minimum, applied vertically and horizontally at top of handrail, when tested in accordance with ASTM E935.
      c. Concentrated Loads: 200 lb minimum, applied to handrail horizontally and vertically, in accordance with ASTM E935.

C. Assembly: Use slip-on, nonweld mechanical fittings, flanges, escutcheons, and wall brackets to join lengths, seal open ends, and conceal exposed mounting bolts and nuts.

D. Joints: Machined smooth with hairline seams; tightly fitted and secured.

E. Field Connections: Provide sleeves to accommodate site assembly and installation.

F. Structural Glass Railing System, Clamp-Mounted: Engineered, point-supported railing system with structural glass.
   1. Configuration: Guardrail with separate handrail.
   2. Top Rail: 2-inch diameter stainless steel; No.4 satin finish.
   3. Grip Rail: Round, stainless steel, 1-1/2-inch diameter.
   4. Clamps: Stainless steel pressure clamps; no holes drilled in glass.
   5. Glass: As specified in this section.
   6. Handrail Brackets: Same metal as railing.
   7. Fasteners:
      a. Attachment to Steel: Provide 24-inch center-to-center hole spacing; 1/2-inch stainless steel, socket head cap screws for drilled and tapped or drilled and bolted attachment.

2.03 MATERIALS

A. Glass: Laminated safety glass; ASTM C1172.
   1. Plastic Interlayer: Minimum 0.060 inch thick.
   2. Impact Strength: Category II, tested in accordance with 16 CFR 1201.
   3. Thickness: 1/2 inch minimum.
   4. Configuration: As indicated on drawings.
   5. Edges: Ground smooth and polished.
   6. Color: To be selected by Architect.

2.04 FABRICATION

A. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
   1. Ease exposed edges to small uniform radius.
   2. Welded Joints:
      a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
      b. Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.

2.05 ACCESSORIES

A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.

B. Anchors and Fasteners: Provide anchors, fasteners, and other attachment devices required to attach to structure, of type recommended by decorative railing manufacturer for applicable substrate(s).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Notify Architect immediately of conditions that would prevent satisfactory installation.

D. Do not proceed with work until detrimental conditions are corrected.

3.02 PREPARATION

A. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.

B. Clean surfaces to receive railings. Remove materials and substances detrimental to installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.

C. Anchor securely to structure.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Test railings for structural performance in accordance with ASTM E935.

C. Nonconforming Work: Repair nonconforming work and retest until work complies with specified requirements.

D. Manufacturer Services: Provide services of manufacturer's field representative to observe railing installation.

3.05 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Remove protective film from exposed metal surfaces.

C. Metal: Clean exposed metal finishes with potable water and mild detergent in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage material or finish.

D. Glass and Glazing: Clean glazing surfaces; remove excess glazing sealant compounds, dirt, and other substances.

3.06 PROTECTION

A. Protect installed components and finishes from damage after installation.

B. Repair damage to exposed, making finishes indistinguishable from undamaged areas.

C. Replace finishes and components that have irreparable damage. Ensure damaged areas are indistinguishable from undamaged finishes and surfaces.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 FILED SUB-BID REQUIRED

A. Portions of the work of this section are assigned to the following:
   1. Roofing and Flashing Trade Contractor, for blocking associated with roof systems. See Section 07 00 02 - Roofing and Flashing Trade Bid Summary.

1.02 SECTION INCLUDES

A. Furnish and install the following:
   1. Rough opening framing for doors, windows, louvers, roof openings, curtainwall, and storefront.
   2. Roofing nailers.
      a. Provide wood blocking associated with roofing insulation, around all roof edges except where specifically indicated otherwise.
   3. Preservative treated wood materials.
   4. Fire-retardant treated wood materials.
   5. Communications and electrical room mounting boards.
   6. Concealed wood blocking, nailers, and supports.
      a. Blocking for installation of interior items intended for wall or ceiling application, including but not limited to: millwork and casework cabinets, handrails, toilet partitions, toilet accessories, solar shades at window heads, lockers, fire protection specialties, visual display units, wall-mounted technology items, and other appurtenances indicated on Drawings or in this Project Manual or required by other subcontractors.
   7. Miscellaneous wood nailers, furring, and grounds.
   8. Accessories including, but not limited to, metal connector plates, structural connectors, and fasteners.

1.03 ABBREVIATIONS AND ACRONYMS

A. AFPA. American Forest and Paper Association; www.afandpa.org.
B. ALSC. American Lumber Standard Committee: www.alsc.org.
C. APA. The Engineered Wood Association; www.apawood.org.
D. ASTM. ASTM International; www.astm.org.
E. AWPA. American Wood Protection Association; www.awpa.com.
F. CDPH. California Department of Public Health; www.cdph.ca.gov.
G. FSC. Forest Stewardship Council; www.fsc.org.
H. NELMA. North Eastern Lumber Manufacturer's Association; www.nelma.org.
I. NIST. National Institute of Standards and Technology; www.nist.gov/standards.
J. NLGA. National Lumber Grades Authority: www.nlga.org.
K. PS. Voluntary Product Standard, The Engineered Wood Association: www.apawood.org.
L. WCLIB. West Coast Lumber Inspection Bureau: www.wclib.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AFPA (NDS) - National Design Specification for Wood Construction.
C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
F. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
G. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems.
H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
I. AWPA P25 - Standard for Inorganic Boron.
J. AWPA P27 - Standard for Alkaline Copper Quat Type B.
K. AWPA P29 - Standard for Alkaline Copper Quat Type D.
L. AWPA P32 - Standard for Copper Azole Type B.
M. AWPA P48 - Standard for Copper Azole Type C.
N. AWPA P51 - Standard for Zinc Borate.
O. AWPA U1 - Use Category System: User Specification for Treated Wood.
P. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
Q. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.
R. FSC - Forest Stewardship Council.
S. FSC-STD-40-004 - Chain of Custody Certification.
T. NELMA (SGR) - Standard Grading Rules for Northeastern Lumber.
U. NIST Voluntary Product Standard PS 1 - Structural Plywood.
V. NLGA (SGRNL) - Standard Grading Rules for Canadian Lumber.
W. PS 20 - American Softwood Lumber Standard.
X. SCAQMD 1168 - Adhesive and Sealant Applications.
Y. WCLIB (GR) - WCLB Standard Grading Rules for West Coast & Imported Softwood Lumber No.18.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data: Provide technical data on wood preservative materials and application instructions.
    2. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.
    3. Certificates: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
        a. Wood Moisture Content: Certificates of Grade and kiln drying (KD) by ALSC-recognized inspection agency.
        b. Fire-Retardant Treatment: Certify that fire-retardant treatment materials comply with governing ordinances and that treatment will not bleed through finished surfaces.
        c. Preservative-Pressure-Treated Wood: Treating plant shall certify that chemicals and process used, net amount of salts retained, and conformance with applicable standards.

Certify that moisture content was reduced to 19 percent maximum, after treatment for water-borne preservative treatment.

4. Test and Evaluation Reports: Submit test reports by an independent testing laboratory showing reduced strength values and design stress reduction values for all fire-retardant wood and plywood.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this section to potential LEED credits to the project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) FSC-certified wood products.
         2) Environmental Product Declarations (EPD).
         3) Low-Emitting Materials: Document that materials do not exceed VOC limits of either the CAL (CDPH SM), including 2004 addenda, or adhesives, sealants and sealant primers must comply with SCAQMD 1168 and rule amendment date of January 7, 2005. Refer to Section 01 81 13 - Sustainable Design Requirements.
            (a) Composite Wood and Agrifiber Products: Composite wood products used within the building waterproofing barrier layer shall be urea-formaldehyde free.
         4) Ultra Low-Emitting Formaldehyde (ULEF) or No Added Formaldehyde (NAF) in plywood, and other sheet or composite wood products compliant with CARB (ATCM) limits.
         5) Refer to Section 01 81 13 - Sustainable Design Requirements for VOC limits.

D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.

1.06 QUALITY ASSURANCE

A. Regulatory Agency Approvals:
   1. Lumber Grading Rules and Wood Species to be in conformance with PS 20.
   2. Grading rules of the following associations apply to the materials furnished under this section:
      a. National Lumber Grades Authority: NLGA (SGRNL).
      b. West Coast Lumber Inspection Bureau: WCLIB (GR).
      c. The Engineered Wood Association (APA).
   3. Grade Marks:
      a. Identify lumber, mat formed particleboard and plywood by official grade mark.
      b. Lumber:
         1) Grade stamp to contain symbol of grading agency certified by Board of Review, American Lumber Standards Committee, mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded, where applicable, and conditions of seasoning at time of manufacture.
            (a) S Dry: Maximum 19 percent moisture content.

(b) MC 15: Maximum 15 percent moisture content.

4. Codes: Wood construction shall conform to the requirements of AFPA (NDS), and MSBC (CMR 780) requirements.
5. Use of Chromated Copper Arsenate (CCA) type preservative treatment for lumber is prohibited.

B. Sustainability Requirements:
1. Certified Wood Materials: Where project's LEED goals require FSC-certified wood, meet FSC-STD-40-004 chain-of-custody requirements.
2. Composite wood and agrifiber products shall contain no added urea-formaldehyde resins.
3. Wood Treatments: Free of hexavalent chromium, arsenic, halogens, sulfates, and ammonium phosphate.
4. Engineered wood shall be made using non-toxic glues, no added formaldehyde, and 100 percent recycled fibers or certified sustainably harvested wood.

1.07 MOCK UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes the work of this section.
1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Comply with specified requirements, Section 01 60 00 - Product Requirements, and the following:
1. Immediately upon delivery to job site, place materials in area protected from weather.
2. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation and ventilation.
3. Do not store seasoned materials in wet or damp portions of building.
4. Protect sheet materials from corners breaking and damaging surfaces, while unloading.
5. Damaged products due to improper storage and handling shall be replaced at no cost to the Owner.

B. Fire-Retardant Treated Wood: Prevent exposure to high humidity, moisture, and precipitation during shipping, storage, and installation.

1.09 FIELD CONDITIONS

A. Do not install rough carpentry materials that are wet, moisture damaged, or mold damaged.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Contractor shall provide wood treatment manufacturer's limited lifetime warranty against structural damage due to termites or carpenter ants, or fungal decay. Warranty shall be issued on completion of the work and begin on the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 DESCRIPTION

A. Regulatory Requirements:
1. Dimension Lumber: Comply with NIST Voluntary Product Standard PS 1, and applicable grading rules of the inspection agency, as certified by ALSC's Board of Review for wood species as included in the work:
a. NELMA (SGR): Northeastern Lumber Manufacturers Association.
b. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
c. For exposed lumber, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

B. Lumber fabricated from old growth timber is not permitted.
C. Sustainability Characteristics:
    1. Provide sustainably harvested wood; see Section 01 81 13 - Sustainable Design Requirements for requirements.
    2. Provide wood harvested within a 100-mile radius of the project site; see Section 01 81 13 - Sustainable Design Requirements for requirements for locally-sourced products.

2.02 PERFORMANCE / DESIGN CRITERIA

A. Dimension Lumber for Concealed Applications:
    1. Sizes: Nominal sizes as indicated on drawings.
    2. Moisture Content: S-dry or MC19.
    3. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
        a. Lumber: S4S, No. 2 or Standard Grade.
        b. Boards: Standard or No. 3.

2.03 ACCESSORIES

A. Metal and Finish of Fasteners:
    1. Untreated Wood: Unfinished steel.
B. Fasteners and Anchors: Use only fastener and connector types that are compatible with wood treatment used.
    1. Metal and Finish:
        a. Steel Batch Hot-Dip Galvanized (HDG):
            1) Fasteners: Hot-dipped galvanized steel complying with ASTM A153/A153M, class D, for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
            2) Connectors: Hot-dipped galvanized mild steel per ASTM A123/A123M.
        b. Steel Continuous HDG: Hot-dipped galvanized per ASTM A653/A653M with a G90 or G185 coating.
        c. Exceptions: Provide Type 304 (316 in ocean saltwater environments) Stainless Steel connectors and fasteners for pressure treated wood with actual retention levels greater than 0.40 pcf for ACQ or MCQ, 0.41 pcf for CBA-A, or 0.21 pcf for CA-B (with ground contact).
            1) Verify retention levels with preservative treatment facility.
    2. General Requirements for Fasteners.
        a. Fasteners: “Fasteners” includes nails, screws, bolts, wedge bolts, expansion bolts, chemical bolts, epoxy anchors, pins, powder-actuated devices, and all other types of mechanical connections.
        b. Completely Specified Fasteners: Where fasteners are completely specified in the Contract Documents, provide the specified type of fasteners.
        c. Fasteners Not Completely Specified: Fasteners may not be completely specified in the Contract Documents:
            1) To allow the Construction Manager or applicable Trade Contractor to control means, methods, and techniques of construction.
            2) When “engineering By Contractor” is required.
        d. Use fasteners appropriate to substrate surface being attached to.
            1) When bolt holes are provided in substrate materials such as structural steel, provide bolted connection of materials of this section at frequency of holes. Provide fastener sizes appropriate to holes provided, or if schedule permits coordinate the size with

other trades prior to fabrication. Bolts shall be hex head with matching nuts and cut washers.

2) Use toggle bolt type fasteners for anchoring material to hollow construction where concealed blocking is not provided.
3) Provide low-velocity power driven fasteners such as masonry screws or expansion shields anchors for attachment to solid construction, including but not limited to concrete and solid masonry.
4) Provide screw-type machine screws for attachment to light gauge metal framing or Type 1 sheet metal blocking, and wood screws for attachment to wood blocking or grounds.

e. Countersink fastener heads to allow installation of overlying materials and finishes where they occur.
f. For fasteners not completely specified in the Contract Documents:
   1) Select fasteners appropriate for each condition, substrate, load, and exposure.
   2) Use fastener manufacturer's published load tables to determine fastener size and spacing.
      (a) Provide a factor of safety of four or higher.
   3) Working load shall be maximum 25 percent of ultimate load capacity.
   4) Provide corrosion resistance at least equivalent to items being fastened.
   5) Install fasteners in compliance with the fastener manufacturer's recommendations.
g. Fasteners for "engineering by Contractor": Provide fasteners indicated on the engineered shop drawings.
h. Fasteners Requiring Pre-drilling or "Pilot" Holes:
   1) Use only the fastener manufacturer's recommended coordinated drill bit diameter.
   2) Drill hole to depth recommended by fastener manufacturer.
   3) Clean holes prior to installation of fasteners.
i. Quantity: As shown or, if not shown:
   1) Provide one fastener for each factory provided fastener hole in item being fastened, or in each hole provided in substrate being attached to.
   2) Provide at least two fasteners for each individual item being fastened.
   3) Provide quantity to provide fastener working load capacity at least four times the actual load.

3. Multipurpose Construction Adhesive: Formulation complying with ASTM D3498 with VOC content complying with project's LEED requirements and recommended for indicated use by adhesive manufacturer.

2.04 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   1. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
   2. Do not use treated wood in applications exposed to weather or where the wood may become wet, unless noted otherwise.

C. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

D. Fire-Retardant Treatment (FRT):
   1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
   2. Treat all exterior rough carpentry items and all wood bridging the plane of exterior wood sheathing, partly interior and partly exterior.
   3. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
   4. Treat rough carpentry items as indicated, required by applicable state and local codes, and rules and regulations of the authority having jurisdiction (AHJ).

E. Preservative Treatment (PPT):
   1. Preservative treatment by Waterborne Pressure Process Treatment: All wood to the exterior of the plane of gypsum board sheathing, exterior CMU, or roof deck shall be PPT unless specifically indicated as otherwise on drawings.
      a. Acceptable PPT Types:
         1) Alkaline Copper Quaternary: ACQ-D per AWPA P29, or ACQ-B per AWPA P27 (for Western wood).
         2) Copper Azole: CA-B per AWPA P32, or CA-C (Wolmanized) per AWPA P48.
         3) Sodium Borates: SBX / DOT per AWPA P25; for interior use only.
         4) Zinc Borate: ZB per AWPA P51; for interior use only.
         5) Micronized Copper Quaternary: MCQ, and MCA / CA-C (EPP certified only).

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas for compliance with requirements affecting work performance.
      a. Verify that field measurements, surfaces, substrates, structural support, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness, absence of water, ice, or snow, and other conditions are acceptable and ready to receive work.
      b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION - GENERAL

A. General: Install wood blocking as indicated by the drawings and as indicated by the specifications.
   1. Install blocking promptly to avoid work delays.
   2. Select material sizes to minimize waste.
   3. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including shims, bracing, and blocking.

4. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.
5. Dissimilar Metal Warning: Do not place hot-dip galvanized and stainless steel components in contact with each other. Use components made of similar, non-reactive metals.

3.03 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.04 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

3.05 CLEANING

A. Prevent sawdust and wood shavings from entering the storm drainage system.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 06 17 21
DOWEL-LAMINATED TIMBER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish and install the following items to complete the work of this Section as shown on the drawings and specified herein:
   1. Dowel-laminated timber panels (DLT) manufactured from sawn lumber boards.
   2. Connectors, fasteners, connection plates, steel assemblies, and welds as shown.
   3. Shop-fabrication, including shop machining for connectors.
   4. Shop-applied finishes and intumescent paint.
   5. Erection.
   6. Cleaning.
   7. Unless specifically excluded, furnishing and installation of any other items of DLT work indicated on the Drawings, specified, or to make the work of this Section complete.

B. Sustainable Design Intent: 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 Division 01 Section “SUSTAINABLE DESIGN REQUIREMENTS” for certification level and certification requirements.

C. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to the Owner’s LEED v4 BD+C certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

D. Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.02 RELATED REQUIREMENTS

A. The Conditions of the Contract and General Requirements of the Project Manual, including the Construction Manager’s Scoping documents apply to this subcontractor, material suppliers, and all other persons furnishing labor and materials under this Section. General Conditions, Supplementary Conditions, Construction Manager’s Scoping documents, and applicable parts of Division 01 are included as part of this Section.

B. Work described in other Sections which contain requirements applicable to the work of this Section, or with which this subcontractor shall coordinate the Work of this Section include, but are not limited to the following:
   1. Section 01 45 23 - TESTING AND INSPECTING SERVICES.
   2. Section 01 60 00 – PRODUCE REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings and sealants.
   3. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
   4. Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS
   5. Section 05 12 00 - STRUCTURAL STEEL FRAMING.
   6. Section 06 18 50 – GLUED-LAMINATED TIMBER BEAMS AND DECKING.
   7. Section 07 54 00 – THERMOPLASTIC MEMBRANE ROOFING.
   8. Section 07 81 00 – APPLIED FIRE PROTECTION; surface preparation of steel scheduled to receive fireproofing.
   9. Section 07 81 23 - INTUMESCENT FIRE PROTECTION; surface preparation and priming of steel scheduled to receive intumescent fire proofing.

10. Section 23 00 10 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC); coordination and requirements of glulam-framed floor and roof openings for HVAC ducts and equipment.

1.03 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this Section is required to attend pre-installation conference specified under Section 07 54 00 – THERMOPLASTIC MEMBRANE ROOFING.

1.04 DEFINITIONS

A. Performance-Rated Dowel-Laminated Timber (DLT): A prefabricated engineer wood product made of graded sawn lumber boards that are laminated by hydraulically pressing hardwood friction fitted dowels through the boards.

1.05 REFERENCE STANDARDS

A. Except as otherwise specified herein, perform work in accordance with specifications noted below, including latest editions of applicable specifications, codes, and standards cited therein, and latest applicable addenda and supplements. Copies of these items shall be kept available in shop and field.
   1. Massachusetts Amendments to the International Building Code 2021, 10th edition.
   2. International Building Code (IBC 2021).
   3. The Timber Construction Manual, Part II: Design (AITC, 6th Edition).
   4. National Design Specification for Wood Construction (NDS 2018).
   5. Special Design Provisions for Wind and Seismic (AWC SDPWS-2019).
   6. Any material or operation specified by reference to published specifications of manufacturer or published standard shall comply with said specification or standard. In case of conflict between referenced specifications, most stringent requirement shall govern. In case of conflict between referenced specifications and Project Specifications, Project Specifications shall govern.

1.06 SUBMITTALS

A. Product Data: For performance-rated dowel-laminated timber and connectors.
   1. Indicate data on lumber, adhesives, fabrication, and protection.
   2. Panel layout, including plans and elevations. Dimensions, shapes and sections, openings, support conditions, and connections shall also be indicated.
   3. Indicate stress grade and identify span direction. Clearly mark each panel type on the drawing.
   4. Indicate location of DLT panel by same identification mark placed on panel.
   5. Indicate lifting connection locations where applicable.
   6. Indicate locations, tolerances, and details of anchorage to supporting structure.
   7. Include and locate openings 6 inches or larger.
   8. Indicate relationship of DLT panels to adjacent structural elements. Include installation instructions for timber connectors.
   9. Where applicable, provide three dimensional models of building identifying DLT panel construction.

B. Shop Drawings: Show layout of performance-rated dowel-laminated timber system and full dimensions of each member. Indicate species and laminating combination, and other variables in required work.
   1. For each panel:
      a. Show layout, dimensions, major strength direction, and elevations. Label each mass timber panel with a piece number or other unique mark.
      b. Clearly indicate DLT grade, appearance classification, and shop finishes.

c. Indicate specific species or veneer requirements on the exposed layer of the panel.
d. Include dimensioned details of cuts, openings, holes, fasteners, and connection hardware.
e. Provide weight and center of gravity coordinates of each panel.
f. Provide designated lift points of each panel.

2. Indicate the location of structure and elements supporting the mass timber panels. Indicate slope of panels in installed position.
3. Indicate the size and shape of openings in mass timber panels, positioned relative to gridlines in plan, and positioned relative to floor levels in elevation.
4. Shop drawing submittal can be combination of layout, installation and/or piece drawings.
5. Include large-scale details of connections.
6. Provide connections and details, joint patterns, material specifications, and finishes.

C. Samples: Sizes per the following, showing the range of variation to be expected in appearance of performance-rated dowel-laminated timber.
1. Submit three samples of manufactured mass timber panels, approximately 12 inches by 12 inches for each thickness required, with shop-applied finish coating.
a. DLT six inch Acoustic
b. DLT eight inch Acoustic
2. Apply specified factory finish to three sides of half-length of each sample.

D. Delegated-Design Submittal: For performance-rated dowel-laminated timber and timber connectors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Substitutions for panel sizes, type, connection details or any other modifications proposed by Contractor shall be considered by Architect only under following conditions:
1. That request has been made and accepted prior to submission of Shop Drawings.
2. That there is a substantial cost advantage or time advantage to Owner; or that proposed revision is necessary to obtain required materials or methods at proper times to accomplish work in time scheduled.
3. That sufficient sketches, engineering calculations, and other data have been submitted to facilitate checking by Architect, including cost reductions or savings in time to complete work.

F. Qualification Data: For manufacturer.

G. Research/Evaluation Reports: For performance-rated dowel-laminated timber and connectors.

H. Weather and Moisture Protection Method Statement: Submit for record a written statement of the means and methods employed to monitor and manage the effects of exterior exposure on the DLT during construction.

I. Installation Method Statement: The Contractor shall hire a registered design professional to author and submit for record a written statement of the means and methods employed for the installation and temporary support of DLT panels and supporting structure during construction.
1. Where concealed connections of temporary bracing are not possible, include proposed repair procedures for mass timber panels after temporary connections are removed.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with NDS.

B. Manufacturer Qualifications: Provide factory-dowel fabricated units produced by an AITC- or APA-licensed firm.

1. Factory mark each piece of performance-rated dowel-laminated timber with AITC Quality Mark or APA trademark. Place mark on surfaces that will not be exposed in the completed Work. Alternatively provide letter stating compliance to the AITC Quality or APA trademark.
2. In lieu of grade stamping lumber exposed to view, submit manufacturer's certificate certifying that products meet or exceed specified requirements.
3. Marks or certificates shall contain the following information:
   a. DLT grade qualified in accordance with APA
   b. DLT thickness or identification
   c. The mill name or identification number
   d. Production lot number or job identification number to trace the DLT product back to the production and quality control records of the manufacturing facility.

C. Professional Engineer Qualifications:
1. Submit qualifications data showing the professional engineer is legally qualified to practice in the jurisdiction where the project is located and who is experienced in providing engineering services for installations of dowel-laminated timber that are similar to those indicated for this project in material, design, and extent.
2. Responsibilities include:
   a. Carefully reviewing performance requirements of dowel-laminated timber and design criteria stated in the Contract Documents.
   b. Preparing written requests for clarifications or interpretations of performance requirements or design criteria for submittal to Engineer by Contractor.
   c. Preparing or supervising preparation of design calculations and related drawings, Shop Drawings, test plan development, test-result interpretation, and comprehensive engineering analyses verifying compliance of dowel-laminated timber with requirements of the Contract Documents.
   d. Signing and sealing all calculations, design drawings, and Shop Drawings.
   e. The registered engineer is to make periodic visits to the site to inspect and test the dowel-laminated timber and other metal work assemblies. After completion of the work and based on these inspections, an affidavit stamped with the seal of the engineer is to be issued to the structural engineer of record (SER). The affidavit shall state that the work has been installed in accordance with his/her design.

D. Preinstallation Conference: Conduct conference at Project site.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow.
2. Notify Owner's representative, Architect, and testing agency of scheduled meeting dates.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect mass timber panels during delivery, storage and handling with water-resistant covering, with water-resistant seams, in accordance with Weather and Moisture Protection Plan.

B. Support units during shipment on non-staining material in same position as during storage.

C. Store units with adequate bracing and protect units to prevent contact with soil and separated with stripping, so air may circulate around all faces of mass timber panels. Take actions to prevent staining, cracking, distortion, warping or other physical damage.
1. Handle and transport units in a position consistent with their shape and design to avoid excessive stresses that would cause cracking or damage. Protect corners with wood blocking.

2. Slit underside of weather-resistant membrane covering during storage at site to avoid accumulation of condensation or moisture. Take care to not deface underside surface of mass timber panels.
3. If factory coverings have been removed, cover top and sides with opaque moisture-resistant membrane.
4. Lift and support units only at designated points shown in shop drawings.

1.09 LEED SUBMITTALS

A. This subcontractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator for submission to LEED-Online: https://leedonline.usgbc.org. Refer to Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS for all requirements; and Section 01 81 13.40 – SPEC MATERIALS TRACKING MATRIX.

1.10 TESTING AND INSPECTION

A. Inspection, Testing, and Quality Control:
   1. 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 initial inspection and testing shall be borne by the Owner. This subcontractor shall be responsible for all costs related to re-inspection or retesting of work identified or proven to be defective.

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 Construction Manager 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.

1.11 GUARANTEE

A. The Construction Manager shall furnish to the Owner a written guarantee covering all defects in materials and workmanship of the work of this Section that occur within a period of one year from the date of final completion of the building. Should any defects in materials or workmanship develop within this time, all necessary repairs and replacements shall be made at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design performance-rated dowel-laminated timber and connectors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated, for all items related to the DLT members whose design has not been provided.

B. Structural Performance: Performance-rated dowel-laminated timber and connectors shall meet the performance requirements for the structural loads shown on the Contract Documents.

C. Seismic Performance: Performance-rated dowel-laminated timber and connectors shall withstand the effects of earthquake motions determined according to ASCE 07. All DLT roof and floor panels shown on the Contract Documents shall be considered DLT diaphragms.

D. Fire Performance: Performance-rated dowel-laminated timber and connectors shall be designed to provide a fire resistance rating as indicated in the Contract Drawings.

2.02 PERFORMANCE-RATED DOWEL-LAMINATED TIMBER

A. General: Provide performance-rated dowel-laminated timber that complies with or demonstrates equivalency to research/evaluation reports acceptable to authorities having jurisdiction.

1. Provide performance-rated dowel-laminated timber made from a single species. Species to be provided is subject to acceptance by the Architect based on samples to be submitted.
2. Provide performance-rated dowel-laminated timber made from solid lumber boards; do not use laminated veneer lumber.

B. DLT grade and layup requirements as specified in Structural Contract Documents.
C. Appearance Grade: Architectural appearance grade.
D. Profile: Square edge.
E. Acoustic Profile: Where specified in Contract Documents the acoustic square profile shall incorporate a grove into the sides of each board which is filled with non-combustible, fibrous insulation strips. Minimum noise reduction coefficient shall be 0.70.
F. Surfacing: Exposed face(s) shall be surfaced smooth, with no misses permitted.
G. Pitch Streaks: Pitch streaks are not permitted.
H. Wane: Wane on exposed panel face(s) is not permitted.
I. The corners of the panel exposed to view in the final structure shall be eased with a minimum radius of 1/8 inches or equivalent chamfer
J. Staining: Heart and/or blue stain are allowed up to five percent of visual surface.
K. Shake and Checks: Shall not exceed 36 inches or ¼ of panel length.
L. Color: Natural color sealer coat with low VOC that protects against moisture absorption and protects against UV degradation to be applied on exposed surfaces (both top and bottom of decking). Color shall match architect's control sample.
M. Penetrating Sealer: Provide manufacturer's standard, dry appearance penetrating acrylic sealer. Color shall match Architect's sample.
N. Moisture: Moisture content at time of manufacture shall not exceed a maximum of 16%.

2.03 TIMBER CONNECTORS

A. General: Provide connections consistent with the details provided on the drawings. Unless otherwise indicated, timber connections to be fully concealed. Unless otherwise indicated, fabricate steel assemblies for timber connections from the following materials:
   1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36.
   2. Round steel bars complying with ASTM A 575, Grade M 1020.
   3. Hot-rolled steel sheet complying with ASTM A 1011, Structural Steel, Type SS, Grade 33.
   4. For Canadian grades provide documentation of equivalency to ASTM.
B. Provide bolts, 3/4 inch, unless otherwise indicated, complying with ASTM A 307, Grade A; nuts complying with ASTM A 563; and, where indicated, flat washers.
C. Finish steel assemblies for interior use with sand blaster surface preparation and powder coated primer.
D. Hot-dip galvanize steel assemblies and fasteners for exterior use after fabrication to comply with ASTM A 123 or ASTM A 153.
E. Fasteners:
   1. Nails: Conform to ASTM F1667.
   2. Wood Screws: Conform to ASME B18.6.1.
   3. Proprietary Self-Tapping Screws: Conform to third party product evaluation report from an accepted agency.
F. Structural Wood Fasteners – Proprietary Self-Tapping Type
   1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
      a. Simpson Strong-Tie Co. Inc.; SDS
      b. MTC Solutions; ASSY

c. Rotho Blass USA; VGS

G. Tension Straps
1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
a. Simpson Strong-Tie Co. Inc.; MTWS, MDCST
b. MTC Solutions; MTS
c. Rotho Blass USA; LBV

H. Coiled Straps
1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
a. Simpson Strong-Tie Co. Inc.; CMST, CMSTC
b. Rotho Blass USA; LBB

I. Diaphragm Spline Straps
1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
a. Simpson Strong-Tie Co. Inc.; MDSS, LDSS

2.04 ACCESSORIES

A. Sound Attenuation Mat:
1. Nominal thickness: ¾ inch.
2. Acoustic performance: IIC rating of minimum 50 in combination with finish floor installation, structure, and additional floor/ceiling materials.
3. Material description: extruded polymer with incorporated vapor barrier on top.
4. Installation requirements per manufacturer instructions, such as, but not limited to:
a. Minimum two inch cementitious topping.
b. Perimeter isolation strip
c. Tape
d. Acoustic sealant
5. Acceptable products:
a. USG SAM-N75 Supreme
b. Maxxon Acousti-Mat 3/4 Premium
c. Keene Quiet Qurl 075

2.05 MANUFACTURING

A. Manufacture panels in a temperature-controlled facility. Pre-heating board stock is not permitted.

B. Mass Timber Panel Manufacturing Tolerances:
1. Thickness: Plus or minus 1/16 inch or two percent of panel thickness, whichever is greater.
2. Width: Plus or minus 1/8 inch.
3. Length: Plus or minus 1/4 inch.
4. Squareness: Lengths of two panel face diagonals measured between panel corners shall not differ by more than 1/8 inch.
5. Straightness: Deviation of edges from straight line between adjacent panel corners shall not exceed 1/16 inch.

2.06 FABRICATION

A. Shop fabricate for connections to greatest extent possible, including cutting to length and drilling bolt holes.
1. Dress exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 80 grit sandpaper.

B. Seal Coat: After fabricating and sanding, apply a saturation coat of Sansin KP12-UVWpenetrating sealer on installed architectural grade surfaces of each unit.
C. Protection: Members shall be individually or bundle wrapped at fabricator's plant with moisture-resistant wrap.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to site erection, examine site conditions and ensure acceptable conditions for erection.
B. Examine substrates in areas to receive performance-rated dowel-laminated timber, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of performance-rated dowel-laminated timber.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Erect performance-rated dowel-laminated timber true and plumb, with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
    1. Lift with yokes or padded slings and protect corners with wood blocking.
    2. Install performance-rated dowel-laminated timber to comply with Shop Drawings.
    3. Install timber connectors as indicated.
    4. Follow Project's Weather and Moisture Protection Plan throughout construction period, until building is enclosed.
    5. Make adequate provision for possible erection stresses. Set panels level and plumb to correct positions. Securely brace panels and anchor in place to maintain plumb until permanently secured by finished structure.
B. Fit performance-rated dowel-laminated timber in accordance with accepted shop drawings.
    1. Predrill for fasteners using timber connectors as templates.
    2. Dress exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 80 grit sandpaper.
    3. Coat crosscuts with end sealer.
C. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

3.03 PROTECTION

A. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose including protection from weather, sunlight, soiling, and damage from work of other trades.
B. Protect installed mass timber panels from damage during construction, including protection in accordance with Weather and Moisture Protection Plan.
C. Prevent standing water on mass timber panels faces.
D. Adhere to Weather and Moisture Protection Plan for retention of wrappings on mass timber panels until immediately prior to installation.

3.04 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged performance-rated dowel-laminated timber if repairs are not accepted by Architect.

3.05 CLEANING

A. Clean and restore surfaces by sanding or wood bleaching any surfaces deemed exposed to view by the Architect that have been stained or discolored due to moisture or construction activities. Finished surfaces that have been damaged by the necessary repairs are to be recoated required to restore the intended finish.

B. Clean exposed surfaces of mass timber panels after erection and completion of field touch up.
   1. Clean all exposed surfaces.
   2. Perform cleaning procedures, according to mass timber panel manufacturer's written recommendations and as instructed by Architect. Protect other work from staining or damage due to cleaning operations.
      a. Repair water and rust stains.
   3. Do not use cleaning materials or processes that could change the appearance of exposed mass timber panels or damage adjacent materials.

END OF SECTION

SECTION 06 18 50
GLUED-LAMINATED TIMBER BEAMS AND DECKING

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.02 WORK INCLUDED

A. Provide all labor, materials, equipment, services and transportation required to furnish and install as shown on the drawings, as specified herein or both.

B. The work of this section includes, but is not limited to the following

1. Glued-Laminated wood members including but not limited to beams, purlins, girders, headers, rafter, etc.
2. All saddles and/or connections connecting timber beams to steel or timber beams.
3. All connection hardware including fabricated steel brackets, hangers, bracing hardware, bolts, shear plates, clevis, pins, tie rods, hollow structural steel sections, gussets, plates, beam detail connections, angles, brackets, shims, bracing, stiffeners, plates, clips, separators, fittings, bolts and electrodes required to complete the glued laminated timber beams and support of architectural elements.
4. Glued-Laminated supplier shall provide all vertical and lateral support members, both timber and steel, to complete the building structure as indicated on the contract documents and herein, excluding the related materials supplied by other specification sections. Completed Glued-laminated structure is intended to be ready for lateral support of structural steel decking.
5. All blocking, diagonal and horizontal members attached to glued-laminated members as specified herein on the contract documents.
6. Sealant between decking and supporting members for sound attenuation.

1.03 RELATED WORK IN OTHER SECTIONS

A. Examine all other Sections of the specifications and drawings for the relationship of the work under this section and the work of other trades. Cooperate with all trades and coordinate all work under Section therewith.

B. Unless otherwise noted or modified, the following items of related work are to be accomplished under other Sections of the specifications:

1. Sustainable Design Intent: 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 Division 01 Section “LEED v4 BD+C Requirements” for certification level and certification requirements.
2. Section 01 33 00 – SUBMITTAL PROCEDURES.
3. Section 01 33 29 – SUSTAINABLE DESIGN REPORTING: Special administrative and procedural requirements related to the Owner’s LEED v4 BD+C Certificate goals of energy conservation and efficiency, indoor air quality and natural resource efficiency.
4. Section 01 45 23 – STRUCTURAL TESTS AND SPECIAL INSPECTIONS.
5. Section 01 60 00 – PRODUCE REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings and sealants.
6. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
7. Section 03 30 00 – CAST-IN-PLACE CONCRETE
8. Section 04 20 00 – MASONRY

9. Section 05 12 00 – STRUCTURAL STEEL FRAMING
10. Section 05 15 00 – STUD SHEAR CONNECTORS
11. Section 05 21 00 – STEEL JOIST FRAMING
12. Section 05 31 00 – STEEL DECKING
13. Section 05 50 00 – METAL FABRICATIONS
14. Section 06 10 00 – ROUGH CARPENTRY
15. Division 07 – THERMAL AND MOISTURE PROTECTION
16. Section 09 91 00 - PAINTING

1.04 REFERENCES

A. Material manufacture and quality control shall be in conformance with American National Standard ANSI/AITC A190.1 latest edition: “Structural Glued-Laminated Timber.”

B. Conform to “National Design Specification for Stress-Grade Lumber and its Fastenings”.

C. Conform to AITC Standard 108 “Standard for Heavy Timber Construction” for all Glued-laminated framing and construction methods.

D. The current rules and practices set forth by the American Institute of Steel Construction entitled “Specification for the Design, Fabrication and Erection of Structural Steel for Buildings” and “Code of Standard Practice for Steel Buildings and Bridges” shall apply to design, fabrication, and erection work of this Contract, except as otherwise modified by this Specification.

E. All welding and definitions of all terms herein relating to welds, welding and oxygen cutting shall be in accordance with the requirements of the current edition of the “Code for Welding in Building Construction” AWS D1.1.

F. High-strength bolting shall be in accordance with the current “Specifications for Structural Joints. Using ASTM A325 Bolts”.

G. The erection of members must be coordinated with the finished bolting and welding of the members and the installation of decking and floor slabs in accordance with the minimum requirements of the Commonwealth of Massachusetts State Building Code.

H. Erection shall conform to the latest requirements of OSHA.

1.05 SUBMITTALS

A. Samples and shop drawings are to be submitted to the Architect for approval in accordance with the General Conditions.

B. Shop drawings, erection drawings, certifications and schedules, properly checked and coordinated with other parts of the construction, are to be submitted to the Architect for approval.

C. Without limiting the generality of the items mentioned below, shop drawings shall be complete and shall include all information necessary for the fabrication and erection of the component parts of the structure.

1. These drawings shall show: type of member, location and identification mark of each member, dimensions, size and weight of members, and location and size of cuts required by other trades.
2. These drawings shall show all requirements such as (1) temporary members required for erection, including connections.

D. Except as otherwise noted, the approval of shop drawings will be for size and arrangement of principal and auxiliary components and strength of connections. Any error in dimensions shown on the shop drawings shall be the responsibility of the General Contractor.

E. Fabrication of any material, cutting of any holes, or performance of any work, shall not proceed until shop drawings have been reviewed by the Architect.

F. Manufacturers’ certification of beams, connectors, bolts, nuts and filler metal for welding, shall be submitted to the Architect

G. Product data and certificates for the fire retardant treatment are to be submitted to the Architect for approval.

H. LEED Submittals – Refer to Division 01 Section "LEED v4 BD+C Requirements."

1. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
2. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project.
3. LEED Action Plans: provide preliminary submittals indicating how the following requirements will be met:
   a. Construction Waste Management: in compliance with Division 01 Section "Construction Waste Management."
   b. List of proposed materials with recycled content: Manufacturer's certification of recycled content indicating percentage by weight of both pre-consumer and post-consumer recycled content.
   c. Local/Regional materials:
      1) Sourcing location(s): Indicate location of extraction, harvesting and recovery of raw materials used in the product's manufacturing; indicate the distance between extraction, harvesting and recovery and the project site. Indicate percentage of product content from qualified locations.
      2) Manufacturing location(s): indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.

1.06 PRODUCT HANDLING

A. Submit erection and detailed shop drawings of all Glued-laminated members, connections and fabricated steel for attaching timber to other timber members or to other structural supports, lateral bracings, etc.

B. A single source supplier must supply shop drawings for timber members, fabricated steel, lateral rod and tube bracing. Shop drawings not meeting this requirement will be rejected and returned "Not Approved".

C. Submit (2) two timber samples of each member exposed to views for review and approval.

D. Submit calculations to verify the strength and serviceability of all connections to laminated work, to other timber members, or, to concrete or steel. Calculations, plan drawings and connection details must be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

E. Shop drawings to indicate full dimensions of each member. Indicate species and stress grade of lumber, type of glue, and other variables in required work.

F. Shop drawings to clearly indicate and detail all hangers and connectors.

G. Submit certification, indicating glued-laminated timbers comply with requirement of ANSI/AITC A 190 1, latest edition.

1.07 QUALIFICATIONS

A. The General Contractor shall submit conclusive evidence to the Owner that the fabricator and the erector has satisfactorily completed projects of similar scope and have adequate fabrication facilities to meet production requirements.

PART 2 PRODUCTS

2.01 GLUED-LAMINATED TIMBER

A. Provide full Environmental Product Declarations (EPD) per requirements to meet LEED v4 Materials and Resources Credit 2. Industry wide EPD is not acceptable. Provide Health

Product Declarations (HPD) per requirements to meet LEED v4 Materials and Resources Credit 2.

B. Provide factory-glued timber units, produced by an AITC licensed firm qualified to issue the AITC "Quality Inspected" mark. Factory mark each piece of glued-laminated timber with AITC quality inspected mark on surface of timber that will not be exposed in completed work.

C. Structural glued-laminated timber bending members shall be produced by Wood Fabricators Inc., Unit Structures Systems Inc. or an equivalent source approved by the Architect in accordance with applicable provisions of AITC 117. Lumber shall be SF/SF 24F V8 AWS APA rated Southern Pine/Southern Pine dressed to net thickness for each lamination of 1 ½ inches, dried to a moisture content of between 8 and 14 percent. Laminating combinations shall meet the requirements of the ANSI/AITC A190.1 "Structural Glued-Laminated Timber" and shall provide allowable design value of 2400 psi in bending top and bottom (fB), 265 psi in horizontal shear (FV) and 1,800,000 psi in modulus elasticity (E) for dry conditions of service.

D. Exposed structural wood decking: Nominal 3x6 Douglas Fir tongue and groove decking or equivalent structural glue laminated timber decking.

E. Adhesive for laminating shall meet the requirements for wet use conditions of service.

F. Appearance of glued-laminated members shall be Architectural Grade with factory-applied coat of clear penetrating oil approved by the Architect. Submit two samples for approval by Architect prior to finish. Any voids and defects are plugged with wood inserts, not just wood filler.

G. Protect end and cross cut beams with two coats of penetrating sealer. Individually wrap all members with opaque, water resistant, plastic coated paper prior to shipment from shop.

H. Members shall be marked with a Quality Mark, and, in addition, a Certificate of Conformance shall be provided to indicate conformance with ANSI/AITC A190.11. Location of each mark shall be on a surface concealed after installation.

2.02 METAL FABRICATIONS

A. Provide malleable iron shear plates, ASTM A325 bolts, and ASTM A36 Steel for all metal fabrication. Provide steel, brackets, hangers, bracing hardware, bolts, shear plates, clevis, pins, tie rods, gussets, plates, columns and beam detail connections, angles, brackets, shims, bracing, stiffeners, plates, clips, separators, fittings, and bolts to complete the glue laminated timber beam structure in conformance with the contract documents and as specified herein.

B. Provide ASTM A500 Grade 50 for all hollow structural steel sections.

C. Conform to AWS standards for welding.

D. All steel shall be fabricated in accordance with Section 10 "Architecturally Exposed Structural Steel" set forth by the American Institute of Steel Construction entitled "Code of Standard Practice for Steel Buildings and Bridges."

E. Shop fit and match mark all connecting hardware. Loft if necessary to achieve proper fit in the field.

F. All steel fabrication and bracing must be supplied and coordinated by the Glued-Laminated supplier.

G. Shop Paint: All steel with the exception of galvanized steel to be given one coat of 10-99 Tnemec Primer in accordance with the manufacturer's direction.

H. All exterior shapes, plates, bars, bolts, nuts. etc. to be galvanized; and all galvanized steel is to be shop primed (for field topcoat) or to receive a factory coating. See Specifications Section 3.03 for galvanizing and finish requirements.

I. All connections are to be designed by a Registered Professional Engineer registered in the Commonwealth of Massachusetts.

J. Regardless of any testing done by the Owner, the General Contractor is responsible for completing the structural steel work in complete compliance with these Specifications.

K. The General Contractor must set up a quality control program in the shop and in the field to ensure compliance with the Specifications.

PART 3 EXECUTION

3.01 INSTALLATION OF GLUED-LAMINATED MEMBERS

A. Erection shall be performed by experienced glued-laminated wood framing erectors in strict accordance with manufacturer's specific published instructions. Glued-laminated wood framing installations, including connections of framing members to one another and to adjoining work of other sections, shall be structurally sound and securely anchored at all times.

B. When handling glued-laminated wood members, use only non-marring slings. Anchor members to supporting construction by connection steel provided hereunder. Install all laminated wood member-to-member connections as erection proceeds.

C. Coordinate with work of other sections to ensure that sheathing, decking and roofing are applied as soon as possible after erection of laminated members. Protective wrapping shall be left on laminated members until they are entirely enclosed within the building and surrounding finish work of other sections has been completed.

D. Protect all timber and decking during any and all field welding. General Contractor to provide fire watch during welding according to local Fire Authorities. Cost for all fire watch shall be at no additional cost to the Owner.

3.02 GALVANIZING

A. Galvanizing shall be required for all ferrous metals exposed to the weather, moisture or corrosive environment and intended for exterior use including lintels, angles, plates, bolts, nuts, washers, etc. and all items noted on the plans to be galvanized.

B. All hot dipped galvanized steel shall be stamped to indicate ASTM designation and ounces per square foot of nickel-zinc coating. Galvanizing shall comply with applicable portions of the latest editions of following reference standards:

1. ASTM A 123 - Standard Specifications for Zinc (Hot Dip Galvanized) Coating on Iron and Steel Products
2. ASTM A 143 - Safeguarding Against Embrittlement
3. ASTM A 153 - Standard Specifications for Zinc (Hot Dip Galvanizing) on Iron and Steel Hardware
4. ASTM A 384 - Safeguarding Against Warpage Providing
5. ASTM A 385 - High Quality Zinc Coatings
6. ASTM A 780 - Repair of Hot Dip Galvanizing

C. Provide coating iron and steel fabrications applied by the hot-dip process. Deltagalv by Duncan Galvanizing. Provide thickness of galvanizing specified in reference standards. The galvanizing bath shall contain .05%-.09% nickel and other earthly materials.

D. The dry kettle process shall be used to eliminate any flux inclusions on the surface of the galvanized material. Prior to galvanizing, the steel shall be immersed in a pre-flux solution (zinc ammonium chloride). The pre flux tank must be 12 to 14 Baume and contain less than .4% iron. The wet kettle process shall be prohibited.

E. All hot dip galvanizing shall be done after fabrication.

F. All galvanized steel is to be shop primed (for field topcoat) or to receive a factory coating. All galvanized steel shall be painted by the Galvanizer, in his own facility, within 12 hours of galvanizing and then force cured in a booth capable of maintaining 130 degree F. Primergalv and Colorgalv by Duncan Galvanizing or Engineer with process and final inspection documentation.

G. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance Program and an on-premise testing facility capable of measuring the chemical and metallurgical

composition of the galvanizing bath and pickling tanks which have been in effect for a minimum of five years and are acceptable to the Engineer with process and final inspection documentation.

H. 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 quality and itemized description of items processed.

I. The General Contractor must set up a quality control program in the shop and in the field to ensure compliance with the Specifications.

J. When the General Contractor is satisfied that the work is satisfactorily completed, notify the Architect who will make arrangements with the Testing Engineer to be retained by the Owner to verify that the work complies with these Specifications.

3.03 QUALITY CONTROL BY THE GENERAL CONTRACTOR

A. Workmanship of welds shall conform to the requirements of Section 2 Part 3 and Section 4 of the AWS Code, except as modified and supplemented herein. Before welding, particular attention shall be paid to surface preparation, fit up and cleanliness of surface to be welded.

B. All welding shall be done by manual shielded metal arc welding with covered electrodes or by Flux-Core arc welding.

C. The heat, input, length of weld and sequence of weld shall be controlled to prevent distortions. The surfaces to be welded and the filler metals to be used shall be subject to inspection before any welding is performed.

D. All welds shall be sound throughout. There shall be no crack in any weld or weld pass. Welds may be considered sound if it contains only slight porosity or fusion defects which are well dispersed.

E. Undercut shall be more than 0.01 inch deep when its direction is transverse to the primary stress in the part that is undercut. Undercut shall not be more than 1/32 inch deep when its direction is parallel to the primary stress in the part that is undercut.

F. Welds shall be free from overlap.

G. All craters shall be filled to the full cross section of the welds.

H. All welders and welding operators shall be qualified by test as prescribed in Part 2 (Welder) and Part (Welding Operators) of the AWS Code.

3.04 TESTING AND INSPECTION

A. A qualified Testing Engineer will be retained by the Owner to review welding materials, procedures, qualifications of personnel and equipment used to fabricate and erect the structural steel.

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 Architect or Test Agency. Such inspection and testing shall not relieve the General 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 General Contractor shall cooperate with and facilitate inspection and testing by the Testing Agency. The General Contractor shall, upon request and at his own expense, furnish the Testing Agency with the following:

1. Complete sets of approved erection drawings, detailed shop drawings, schedules and corrective work procedures at the fabricating shop or shops and in the field.
2. Cutting list, order lists, materials bills and shopping lists.
3. Information as to time and place of all rolling and shipments of materials 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.

D. The Testing Engineer will inspect all full and partial penetration welds by ultrasonic means. All bolted connections including anchor bolts. Testing Agency to spot check tightening of at least 15% of bolted connections and other field welded connections.

E. Weldments and bolted connections that are required by the Testing Engineer to be corrected shall be corrected without delay at the General Contractor's expense and to the satisfaction of the Testing Engineer.

F. Testing Engineer to review credentials and current certification of welders in shop and field and report to Architect on status of certified welders. No welding is to be done by other than certified welders approved by the testing agency.

G. Any material or workmanship that is rejected by the Architect or the Testing Engineer, either in the mill shop or field, shall be replaced promptly by the General Contractor to the satisfaction of the Architect or the Testing Engineer.

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

I. Inspect the fabrication of the steel at the plant during fabrication to insure that proper materials and techniques are being employed.

J. Inspect field bolting and welding, including welding of the decking, for compliance with these specifications and good workmanship. Report any deficiencies to the Architect.

K. Submit to the Architect the following information regarding the quality control of the welding:
   1. Welder's Certifications.
   2. Shop and Field Inspection Reports.
   3. Record Copies of all Tests.
   4. Certification that the minimum number of connections specified to be tested have been done and found to be in conformance with the Specifications.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Milled wood, including but not limited to, furnishing and installing the following work:
   1. Millwork, molding and trim:
      a. Jamb extensions at interior of windows.
      b. Window sills, with stool and apron trim at window, storefront, and curtain wall openings.
      c. Cased openings.
      d. Solid wood panels and trim.
   2. Wood fire-resistant treatment where required by building code.
   3. Accessories for a complete installation, including but not limited to hardware, fasteners, and connectors.

B. Products Installed by this section but Furnished from Other Sections:
   1. Section 08 11 13 - Hollow Metal Doors and Frames; including setting in place for incorporation into gypsum wallboard and masonry partitions
   2. Section 08 14 16 - Flush Wood Doors; including hanging doors within frames and application of glazing stops and door hardware.
   3. Section 08 31 00 - Access Doors and Panels.
   4. Section 09 84 30 - Acoustic Wall and Ceiling Units.
   5. Section 09 91 13 - Exterior Painting: Back priming to be performed by millwork Contractor.
   6. Section 09 91 23 - Interior Painting: Back priming to be performed by millwork Contractor.
   7. Section 10 14 16 - Plaques.
   8. Section 10 14 19 - Dimensional Letter Signage.
   9. Section 10 14 23 - General Signage.
   10. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.
   11. Section 10 43 00 - Emergency Aid Specialties: Installation of automated external defibrillators (AEDs) with cabinets.
   12. Section 10 44 00 - Fire Protection Specialties: Installation of fire extinguishers with cabinets.
   13. Section 11 52 13 - Projection Screens.

1.02 DEFINITIONS

A. Fire-Retardant-Treated Wood is defined in Section 2303.10 of the MSBC (780 CMR) as “any wood product which, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E84, a listed flame-spread index of 25 or less and show no evidence of significant progressive combustion when the test is continued for an additional 20-minute period. In addition, the flame front shall not progress more than 10.5 feet (3200 mm) beyond the centerline of the burners at any time during the test.”

1.03 ABBREVIATIONS AND ACRONYMS

A. ALSC. American Lumber Standard Committee: www.alsc.org.
B. ANSI. American National Standards Institute; www.ansi.org.
C. ASTM. ASTM International; www.astm.org.
D. AWI. Architectural Woodwork Institute: www.awinet.org.
E. AWMAC. Architectural Woodwork Manufacturers Association of Canada: www.awmac.com.
F. CARB. California Air Resources Board: ww2.arb.ca.gov.
G. CDPH. California Department of Public Health: www.cdph.ca.gov.

H. CFR. Code of Federal Regulations: www.govinfo.gov.
I. FSC. Forest Stewardship Council; www.fsc.org.
J. NELMA. North Eastern Lumber Manufacturer's Association; www.nelma.org.
K. NHLA. National Hardwood Lumber Association: www.nhla.com.
L. NIST. National Institute of Standards and Technology; www.nist.gov/standards.
M. OTC. Ozone Transport Commission: www.otcair.org.
N. PS. Voluntary Product Standard: National Institute of Standards and Technology; www.nist.gov/standards.
O. SCAQMD. South Coast Air Quality Management District: www.aqmd.gov.
P. WI. Woodwork Institute: www.woodworkinstitute.com. www.wdma.com.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
C. ANSI A135.4 - Basic Hardboard.
D. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems.
E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.
G. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards.
H. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
I. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.
J. FSC - Forest Stewardship Council.
K. FSC-STD-40-004 - Chain of Custody Certification.
L. NELMA (SGR) - Standard Grading Rules for Northeastern Lumber.
M. NHLA G-101 - Rules for the Measurement and Inspection of Hardwood and Cypress.
N. NIST Voluntary Product Standard PS 1 - Structural Plywood.
O. OTC Model Rule, AIM - Architectural, Industrial, and Maintenance Coatings.
P. PS 1 - Structural Plywood.
Q. SCAQMD 1168 - Adhesive and Sealant Applications.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
C. Coordinate mounting requirements with Section 06 10 00 - Rough Carpentry or Section 09 21 16 - Gypsum Board Assemblies to ensure that proper extent of wood or sheet metal blocking is installed within partitions for each application or material.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data:
        a. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.

b. Provide data on fire-retardant treatment materials and application instructions.

2. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   a. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   b. Provide information required per AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
3. Finish Mock-Up for Stain Selection. Provide mock-up of not more than five stains on the specified wood species and cuts, for final stain selection.
   a. Wood finishes for the project shall be coordinated across all exposed finished wood products and items, including finished wood products and items specified in other sections. The initial finished wood product samples submitted for selection under any such section which has been reviewed and accepted by the Architect shall serve as the basis of review and coordination for other finished wood products and items for the project.
4. Samples: Submit three samples of finish plywood, 12 by 12 inch in size illustrating wood grain and specified finish.
5. Samples: Submit three samples of wood trim, 6 inches long.
6. Certificates:
   a. Submit manufacturer's (Fabricator's) certification, stating that the fabricated work complies with AWI/AWMAC/WI (AWS) and APA quality grades and other requirements indicated.
   b. KD Certificate for kiln-dried moisture content by ALSC recognized inspection agency.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
   a. Include documentation of:
      1) FSC-certified wood products.
      2) Environmental Product Declarations (EPDs).
      3) Low-Emitting Materials: Document that materials do not exceed VOC limits of either the CAL (CDPH SM), including 2004 addenda, or adhesives, sealants and sealant primers must comply with SCAQMD 1168 and rule amendment date of January 7, 2005. Refer to Section 01 81 13 - Sustainable Design Requirements.
         (a) Composite Wood and Agrifiber Products: Composite wood products used within the building waterproofing barrier layer shall be urea-formaldehyde free.
      4) Ultra Low-Emitting Formaldehyde (ULEF) or No Added Formaldehyde (NAF) in plywood, and other sheet or composite wood products compliant with CARB (ATCM) limits.
      5) Refer to Section 01 81 13 - Sustainable Design Requirements for VOC limits.

1.07 QUALITY ASSURANCE

A. Regulatory Agency Approvals:
1. Lumber Grading Rules and Wood Species to be in conformance with PS 1.

B. Sustainability Standards Certifications:

1. VOC Requirements: Product treatments and finishes shall meet LEED (for interior work) and OTC Model Rule, AIM.
2. Certified Wood Materials: Meet FSC-STD-40-004 chain-of-custody requirements.
3. Engineered wood shall be made using non-toxic glues, no added formaldehyde, and 100 percent recycled fibers or certified sustainably harvested wood.
4. Composite wood and agrifiber products shall contain no added urea-formaldehyde resins.
5. Wood Treatments: Free of hexavalent chromium, arsenic, halogens, sulfates, and ammonium phosphate.

C. Lumber fabricated from old growth timber is not permitted.

D. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum of five years of documented experience.

1.08 MOCK-UPS

A. Stain sample mock up to be sent to Architect for review prior to in-place mock-up of architectural casework to be reviewed by Architect on site.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Comply with specified requirements, Section 01 60 00 - Product Requirements, and the following:

1. Do not deliver woodwork until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas.
2. Do not deliver, store or install finish carpentry items until areas in which items will be stored or installed have been acclimated to a minimum temperature of 70 degrees Fahrenheit, and maximum humidity level of 50 percent.
3. Immediately upon delivery to job site, place materials in area protected from weather.
4. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation and ventilation.
5. Do not store seasoned materials in wet or damp portions of building.
6. Protect fire-retardant materials against high humidity, moisture, and precipitation during storage and erection.
7. Protect sheet materials from corners breaking and damaging surfaces, while unloading.
8. Products damaged due to improper storage and handling shall be immediately removed from site and replaced at no cost to Owner.

1.10 FIELD CONDITIONS

A. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

B. Maintain temperature and humidity in installation area to maintain moisture content of installed woodwork within 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. Woodwork fabricator shall determine optimum moisture content and required temperature and humidity conditions.

PART 2 PRODUCTS

2.01 WOOD-BASED COMPONENTS

A. Regulatory Requirements:

1. Unless otherwise indicated, provide products of quality specified by AWI Architectural Woodwork Quality Standards Illustrated for Premium grade.
2. Provide materials having fire and smoke properties conforming to applicable code.
3. Dimension Lumber: Comply with NIST Voluntary Product Standard PS 1, and applicable grading rules of the inspection agency, as certified by ALSC's Board of Review for wood species as included in the work:

a. NELMA (SGR): Northeastern Lumber Manufacturers Association.
b. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
c. For exposed lumber, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

4. Hardwood Grades per NHLA American Hardwood Lumber Select and No. 1 Common Grades
5. Softwood Grades per NELMA (WWPA) 2 and Better Commons Grade

B. Provide composite wood products complying with composite wood indoor emission requirements in Section 01 81 13 - Sustainable Design Requirements.

2.02 LUMBER MATERIALS

A. Softwood Lumber: Spruce species, quarter sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
1. Grading: In accordance with rules certified by ALSC.

B. Hardwood Lumber: (opaque finish - paint grade) White Maple species, plain sawn, maximum moisture content of 6 percent per AWI, of quality suitable for paint finish.
1. Grading: In accordance with NHLA G-101 Grading Rules; www.nhla.com.

C. Hardwood Lumber (transparent finish): [SPECIES TO BE DETERMINED], plain sawn, KD to a maximum moisture content of 5-10 percent per AWI/AWMAC/WI (AWS); with vertical grain, of quality suitable for transparent finish.
1. Color Contrast of Clear Finished Wood: Unless specifically called out, do not mix sapwood and heartwood where visible or semi-visible.

2.03 SHEET MATERIALS

A. Softwood Plywood, Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B, glue type as recommended for application.

B. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core, glue type as recommended for application.

C. Hardboard: ANSI A135.4: Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth one side (S1S).

2.04 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds. Formulation complying with ASTM D3498 with VOC's not more than 70 g/L.

B. Fasteners: As indicated on drawings for exposed locations; where not indicated of size and type to suit application; mill finish in concealed locations and NAAMM No. 4 stainless steel finish in exposed locations.

C. Concealed Joint Fasteners: Threaded steel.

2.05 ACCESSORIES

A. Lumber for Shimming and Blocking: Softwood lumber of Pine species.

B. Wood Filler: Solvent base, tinted to match surface finish color.

2.06 WOOD TREATMENT

A. Fire-Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

B. Provide identification on fire-retardant treated material.

C. Deliver fire-retardant treated materials cut to required sizes. Minimize field cutting.

D. Redry wood after pressure treatment to maximum 6 percent moisture content.

E. Provide fire-retardant treated wood panels at areas of wood wall paneling exceeding 10 percent of the wall area to which they are mounted, in conformance with building code requirements.

2.07 FABRICATION

A. Expansion / Contraction Movement: Assemble wood products using details that allow for expansion and contraction due to changes in environmental conditions.

B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. Shop prepare and identify components for book match grain matching during site erection.

D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.08 FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

1. Transparent:
    a. System - 2, Lacquer, Precatalyzed.
    b. Use fire-retardant varnish on all finish carpentry where required by code to provide fire-resistance rating of materials.
        1) Provide fire-retardant finish on trim and panels in Cafeteria, Library, Admin/ Reception, corridors.
    c. Stain: As selected by Architect, to match door pre-finished veneer, PLS-101 Village Oak.
    d. Sheen: Flat.

E. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:

1. Carefully examine installation areas for compliance with requirements affecting work performance.
2. Verify that field measurements, surfaces, substrates, structural support, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are acceptable and ready to receive work.
3. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Layout installation by marking extents of each item, and anchoring / fastening locations coordinated with blocking or other structural support.

1. Marks shall be covered up and hidden by installation.
2. Locate areas out-of-level and correct.
3. Protect adjacent substrates, installed work and existing items from damage by construction operations with temporary effective means.

B. Surface Preparation for Coating System: Remove hardware and hardware accessories, plates, and similar items in places that are not to be coated, or provide surface-applied protection prior to surface preparation and painting.
   1. Unfinished Wood Surfaces: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper. Sand smooth surfaces exposed to view and dust off.

3.03 INSTALLATION

A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated, as indicated per Drawings and required by Specifications.
   1. Set and secure materials and components in place, plumb and level.
   2. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
   3. Allow for expansion and contraction movement of wood material joints due to moisture.
   4. Abut and align top and face edge surfaces in one true plane, with internal supports placed to prevent deflection. Plane solid wood when necessary to make top and face planes aligned and flush.
   5. Fasten or anchor materials and units in a concealed manner with fasteners appropriate to use and anticipated durability.
      a. Set exposed fasteners; pre-drill hardwood and countersink nail heads.
      b. Apply wood filler in exposed fastener indentations, fill flush, and sand smooth.
   6. Wood with Transparent Finish: Match color and grain pattern.
   7. Standing and Running Trim: Install with minimum number of joints possible, using full length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and comply with AWI/AWMAC/WI (AWS) for joinery.
      a. Inside Corner: Butt one side-piece to wall, and cope second side piece to fit tight to profile of the first piece.
      b. Outside Corner: Miter both pieces.

B. Fire-Retardant Woodwork: Handle, store, and install in accordance with manufacturer's directions and required to meet required classification or rating. Provide special fasteners, moldings, adhesives and other accessories as tested and listed for type of fire-retardant woodwork indicated.

C. Install Hollow Metal Doors and Frames in accordance with requirements of Section 08 11 13 - Hollow Metal Doors and Frames.

D. Install Flush Wood Doors in accordance with requirements of Section 08 14 16 - Flush Wood Doors.

E. Install Acoustic Room Components in accordance with requirements of Section 09 84 30 - Acoustic Wall and Ceiling Units.

F. Install Plaques in accordance with requirements of Section 10 14 16 - Plaques.

G. Install Dimensional Letter Signage in accordance with requirements of Section 10 14 19 - Dimensional Letter Signage.

H. Install General Signage in accordance with requirements of Section 10 14 23 - General Signage.

I. Install accessories in accordance with requirements of Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

J. Install Emergency Aid Specialties in accordance with requirements of Section 10 43 00 - Emergency Aid Specialties.

K. Install Fire Protection Specialties in accordance with requirements of Section 10 44 00 - Fire Protection Specialties.

L. Finishing:

1. No coarse grained sandpaper marks, hammer marks, or other imperfections will be accepted.

3.04 ADJUSTING

A. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

3.05 CLEANING

A. Waste Management: Comply with Section 01 74 19 - Construction Waste Management and Disposal, applicable regulations, and as follows:

1. Do not burn scrap on project site.
2. Do not burn scraps that have been pressure treated. Collect and legally dispose of scrap.

B. Cleaning: Clean Woodwork on exposed and semi exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

C. Provide Progress Cleaning per Division 01, and as follows:

D. Work Areas: Continuously clean areas where work is in progress to the level of cleanliness necessary for safety and proper execution of the work. Ensure this is completed by the end of each workday.

1. Do not allow wood, scraps, shavings, sawdust to remain on the floor, or on the ground or to be buried in fill.
2. Prevent sawdust and wood shavings from entering the storm drainage system.
3. Broom clean and maintain completed construction until Substantial Completion.

E. Site: Continuously maintain Project site free of waste materials and debris.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, and installing custom-configuration shop fabricated cabinet units and related accessories, including but not limited to the following work:
   1. Wood casework with transparent finish.
   2. Wood casework with opaque finish.
   3. Wood casework with laminate cladding.
   4. Shop finishing.
   5. Preparation for installing utilities.

B. Accesssories required for a complete installation, including, but not limited to, cabinet and drawer hardware, mounting hardware, fasteners, and connectors.

C. Custom casework items include, but are not limited to the following:
   1. Reception desk.
   2. Circulation desk.
   3. Built-in benches, with upholstered cushions.
   4. Window seats, with upholstered cushions.
   5. Display cases; complete with hardware, tempered glass shelves and tempered glass doors.
   6. Vestibule transaction counter.
   7. Stair 5 underside wood and built-in bench seating with upholstered cushions.
   8. Wood Framing at proscenium opening around stage at gymnasium.
   9. Wood slats, framing proscenium opening around stage at cafeteria.
   10. Wood slats at walls.
   11. Built-in window seats with upholstered cushion.
   12. Built-in wood benches at vestibules and at gym.
   13. Circulation desk.
   14. Built-in benches in library with upholstered cushion.
   15. Display cases; complete with hardware, tempered glass shelves and tempered glass doors and LED lighting.
   16. Wood frames at tack boards.
   17. Wood trim at corridor / circulation wall wainscot.
   18. Wood trim, window sills, and aprons.
   19. Trash / recycling centers with sinks.
   20. Administration office reception transaction window.
   21. Student cubbies with hooks and name plates.
   22. Factory finishing.
   23. Accessories including, but not limited to, hardware, fasteners and connectors.

1.02 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.

B. AWI: Architectural Woodwork Institute.

C. AWMAC. Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.

D. BHMA. Builders Hardware Manufacturers Association; www.buildershardware.com.

E. CARB. California Air Resources Board; www.arb.ca.gov.

F. CDPH. California Department of Public Health; www.cdph.ca.gov.

G. DHA. Decorative Hardwoods Association (formerly HPVA); www.decorativehardwoods.org.
H. FSC. Forest Stewardship Council; us.fsc.org.
I. GANA. Glass Association of North America; www.glasswebsite.com.
J. ISO. International Organization for Standardization; www.iso.org.
K. MPI. Master Painters Institute; www.mpi.net.
L. PS. Voluntary Product Standard: National Institute of Standards and Technology; www.nist.gov/standards.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ANSI A135.4 - Basic Hardboard.
C. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications.
D. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
E. ANSI/AWI 0400 - Factory Finishing.
F. ANSI/AWI 0620 - Finish Carpentry/Installation.
G. ANSI/AWI 0641 - Architectural Wood Casework.
H. ASTM C1036 - Standard Specification for Flat Glass.
I. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
J. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
K. AWI (QCP) - Quality Certification Program.
L. AWI 200 - Care & Storage.
M. AWI 300 - Materials.
N. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.
O. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards.
P. BHMA A156.9 - Cabinet Hardware.
Q. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
R. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.
S. FSC - Forest Stewardship Council.
T. FSC-STD-40-004 - Chain of Custody Certification.
U. GANA (GM) - GANA Glazing Manual.
V. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
W. ISO 4586-3 - High-Pressure Decorative Laminates (HPL, HPDL) – Sheets Based on Thermosetting Resins (Usually Called Laminates) – Part 3: Classification and Specifications for Laminates Less than 2 mm Thick and Intended for Bonding to Supporting Substrates.
X. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.
Y. OTC Model Rule, AIM - Architectural, Industrial, and Maintenance Coatings.
Z. PS 1 - Structural Plywood.
AA. PS 20 - American Softwood Lumber Standard.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals

1. Product Data for Wood Casework for Transparent Finish: Submit manufacturer's published, product descriptive data.
    a. Panel Cores for Wood Veneer, HPDL, and TFL Panels: For each type, include thickness.
    b. Hardware: For each type of cabinet hardware.
    c. Locks: For each type of cabinet and drawer lock.
    d. Accessory Components: For each type of glass and grommet.
2. Shop Drawings: Indicate location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components, materials, joint details, accessory listings, hardware location and schedule of finishes, and show relationship and methods of attachments to surrounding construction.
    a. Reference Plans: Casework locations in relative context of building floor plans.
        1) Drawing Scale: 1/8 inch to 1 foot, minimum.
    b. Plans and Elevations: Plan and elevation views of each assembly type.
        1) Include rough opening dimensions and casework assembly dimensions
    c. Detailed Section: Dimensioned section views of each casework configuration.
        1) Include appropriate locations for casework wall anchorage.
        2) Drawing Scale: 1-1/2 inch = 1 foot, minimum.
    d. Details: Dimensioned casework assembly details with material thicknesses.
        1) Include wood veneer panels, laminate-clad panels, panel cores, and concealed casework components.
        2) Drawing Scale: 3 inches = 1 foot, minimum.
3. Samples:
    a. Samples, Solid Wood components with Transparent Finish: For each species and cut, submit three samples, finished on exposed surfaces, representing expected range of color and grain; length: 12 inches, minimum.
        1) Wood finishes for the project shall be coordinated across all exposed finished wood products and items, including finished wood products and items specified in other sections. The initial finished wood product samples submitted for selection under any such section which has been reviewed and accepted by the Architect shall serve as the basis of review and coordination for other finished wood products and items for the project.
    b. Samples, Wood Veneer Panels: For each wood veneer species and cut, submit three finished samples, indicating specified species, cut, and finish; size: 12 by 12 inches, minimum; thickness: 3/4 inch.
    c. Samples, Solid Wood Edgebanding: For each species and cut of solid wood, submit three samples, finished three sides, representing range of color and grain to be provided ; thickness as specified; length: 12 inches, minimum.
    d. Samples, Hardware: For each type of hardware required type, submit three samples, full-size, indicating specified finish.
    e. Samples, Hardware: For each adjustable shelf standard type, submit three samples, indicating specified finish; size: 12 inches.
4. Fabricator's qualification statement.
5. Installer's qualification statement.
6. Specimen draft of farbicator's special warranty.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) FSC-certified wood products.
        2) Environmental Product Declarations (EPDs).
        3) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants, and of paints and coatings.
            (a) Refer to Section 01 81 13 - Sustainable Design Requirements for VOC limits.
        4) Low-Emitting Materials: Ultra Low-Emitting Formaldehyde (ULEF) or No Added Formaldehyde (NAF) in plywood, and other sheet or composite wood products compliant with CARB (ATCM) limits.

D. Closeout Submittals
1. Submit in accordance with the following:
    a. Section 01 70 00 - Execution and Closeout Requirements.
    b. Section 01 78 00 - Closeout Submittals.
2. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
    a. See Section 01 60 00 - Product Requirements for additional provisions.
    b. Spare Parts:
        1) Hardware: Three of each kind of type and size of cabinet hardware, including but not limited to: pulls, hinges, adjustable shelf supports, and sets of drawer glides.
        2) Provide specified spare parts to Owner prior to Substantial Completion.
    c. Submit copy of signed receipt of delivery to the Owner's representative, indicating the recipient name, signature, and an itemized description of materials delivered.
    d. Tools: One each of every special tool required for maintenance of the work of this section.
3. Fabricator/Installer's Certification: Submit certification that all work supplied meets the requirements of the AWI woodworking standards.
4. Warranty Documentation: Submit fabricator's special warranty and ensure that forms have been completed in Owner's name.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum 10 years of experience.
1. Member in good standing of the Architectural Woodwork Institute (AWI) or the Architectural Woodwork Manufacturers Association of Canada (AWMAC) or the Woodwork Institute (WI), and is familiar with the AWI (QCP) Quality Certification Program.

B. Quality Certification:
1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
3. Provide designated labels on shop drawings required by certification program.

4. Provide designated labels on installed products required by certification program.
5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
6. Replace, repair, or rework all work for which certification is refused.

C. Single Source Responsibility: Arrange for architectural woodwork with sequence matched wood veneers to be produced by a single firm.

D. Sustainability Standards Certifications:
1. VOC Requirements: Product treatments and finishes shall meet LEED requirements and OTC Model Rule, AIM.
2. Certified Wood Materials: Meet FSC-STD-40-004 chain-of-custody requirements.
3. Engineered wood shall be made using non-toxic glues, no urea formaldehyde glues, no added formaldehyde, and 100 percent recycled fibers or certified sustainably harvested wood.
4. Composite wood and agrifiber products shall contain no added urea-formaldehyde resins.
5. Lumber fabricated from old growth timber is not permitted.
6. Wood Treatments: Free of hexavalent chromium, arsenic, halogens, sulfates, and ammonium phosphate.

1.06 MOCK-UPS

A. Construct full scale three-dimensional typical base cabinet, wall cabinet, and countertop, as selected by Architect, utilizing final specified and submittal materials including hardware and finishes, and using final production techniques demonstrating the anticipated range of materials, workmanship and finish expected.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

C. Locate where directed by Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Store products prior to installation on flat, level, clean surfaces; elevate products above floors and protect from sunlight.

C. Store products in interior rooms with completed wet work and overhead work.

D. Relative Humidity Conditions for Storing Wood and Wood-Based Core Products:
1. Maintain relative humidity between 25 and 45 percent.

E. Handle materials and products to prevent damage to edges, ends, or surfaces.

F. Handle wood products with clean hands or gloves; protect from marks or damage.

1.08 FIELD CONDITIONS

A. Ambient Conditions for Acclimation, Installation, and Post-Installation of Wood-Based Products:
1. Acclimation Period Prior to Installation: 72 hours minimum, inside installation environment.
2. Temperature Conditions During Installation and Post-Installation: Maintain temperature between 60 degrees F and 90 degrees F.
3. Relative Humidity Conditions During Acclimation, Installation, and Post-Installation: Maintain relative humidity between 25 and 45 percent.

1.09 WARRANTY

A. Fabricator / Special Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
1. Casework Warranty: Provide fabricator’s three-year guarantee against defects in materials and workmanship beginning on the date of Substantial Completion.
a. Defective piece(s) shall be repaired in a timely manner.

b. If quality of repairs is deemed unacceptable by the Architect, promptly replace defective pieces.

PART 2 PRODUCTS

2.01 ARCHITECTURAL WOOD CASEWORK

A. Casework Finish: Wood casework to match the doors: pre-finished veneer, stain: PLS-101 VILLAGE OAK.

B. Provide casework and casework components in sizes and profiles as indicated on drawings.

2.02 PERFORMANCE REQUIREMENTS

A. Architectural Woodwork Institute (AWI) Performance Requirements:

1. Comply with AWI 300, ANSI/AWI 0641, ANSI/AWI 0400, and ANSI/AWI 0620 as applicable for specified casework finish, aesthetic grade, and performance duty level.
   a. Aesthetic Grade: Custom.
   b. Product Performance Duty Level: Duty Level 3.
2. Panel and Material Thicknesses: Provide panels and materials as required to meet specified performance duty level, subject to minimum thickness requirements of AWI 300 and ANSI/AWI 0641 and flatness requirements indicated below.
3. Panel Flatness: Provide panels with maximum variation from flat in 12 inches as measured diagonally across panel.
   a. Custom Grade: Plus or minus 0.047 inch maximum.
4. Cabinet Door Flatness:
   a. Comply with specified performance requirements.

B. Sustainability Characteristics:

1. Wood products shall comply with project's LEED requirements for No Added Formaldehyde (NAF) or Ultra Low-Emitting Formaldehyde (ULEF) for composite wood products.
2. Lumber fabricated from old growth timber is not permitted.
3. Provide sustainably harvested wood; see Section 01 60 00 - Product Requirements for requirements.

2.03 WOOD CASEWORK WITH TRANSPARENT FINISH

A. Finishing Method:

1. Shop-applied finish, to match the doors: pre-finished veneer, stain: PLS-101 VILLAGE OAK.

B. Casework Construction:

1. Face Frame Cabinet and Door Interface: Reveal overlay.

C. Wood Species for Exposed Exterior and Interior Surfaces:

1. Hardwood Species and Cut: As indicated on drawings.

D. Custom Grade - Wood Casework with Transparent Finish:

1. Exposed Exterior Surfaces, Panels to Receive Transparent Finish:
   a. Solid Wood Panels:
      1) Compatible in color and grain with wood veneer.
   b. Wood Veneer Panels:
      1) Face Veneers: Grade C; compatible in color with solid wood panels.
2. Exposed Interior Surfaces, Panels to Receive Transparent Finish:
   a. Wood Surfaces: Same species as exposed exterior surfaces.
   b. Wood Veneer Panels, Face Veneers: Grade B.
3. Exposed Interior Surfaces at Faces of Doors:
   a. Comply with specified performance requirements.
4. Semi-Exposed Surfaces, Panels to Receive Transparent Finish:

a. Wood Veneer Panels, Face Veneers: Grade C; compatible in color.

E. Wood Drawer Boxes - Wood Casework with Transparent Finish:
1. Solid Wood Panels: Comply with AWI 300 custom grade requirements.
2. Wood Drawer Joinery:
a. Dovetail joints.

F. Exposed Exterior Surfaces, Matching of Veneer Leaves:
1. Matching of Veneer Leaves: Slip match.
2. Matching Between Doors, Drawers, and Adjacent Panels: Sequence matched.

G. Grain Direction of Exposed Surfaces:
1. Fascia and Filler Panels: Vertical.
2. Tops: Side to side.
3. Soffits and Bottoms: Side to side.
4. Doors: Vertical.
5. Drawer Fronts:
a. Custom Grade: Comply with specified performance requirements.
6. Face Frame Members: Lengthwise along members.
7. Knee Space Panels: Vertical.
8. Aprons: Vertical.
9. End Panels: Vertical.

H. Edgebanding Applications for Wood Casework with Transparent Finish:
1. Edgebanding: Provide edgebanding on exposed edges.

I. Edgebanding Materials for Wood Casework with Transparent Finish:
1. Comply with specified performance requirements.

2.04 EDGE TREATMENT APPLICATIONS - GENERAL

A. Top Edges of Cabinets:
1. Provide edgebanding at top edges of cabinets less than 80 inches above floor, or when top edges are visible from above.

B. Bottom Edges of Wall Cabinet Ends and Light Valances:
1. Provide edgebanding materials and color to match exposed exterior surfaces.

C. Hinged Door Edges
1. Provide edgebanding on all four edges except for solid wood doors.

D. Sliding Door Edges:
1. Provide edgebanding at vertical edges finished to match exposed surfaces.

E. Stile-and-Rail Door Edges:
1. Fabricated Panels: Provide edgebanding to match exposed surfaces.

F. Drawer Front and Drawer False Front Edges:
1. Provide edgebanding on all four edges except for solid wood drawers.
2. Miter wood edgebanding on exposed front face for thicknesses greater than or equal to 1/4 inch.

G. Adjustable Shelf Edges, Semi-Exposed Surfaces:
1. Provide edgebanding that matches exposed either exterior or interior surfaces at option of fabricator.

2.05 SOLID WOOD COMPONENTS

A. Description: Components fabricated from solid wood; types include profiled components and flat panels.

B. Solid Wood Panels: Compatible in color with and same species as wood veneer.

C. Flat Panels for Drawer Fronts:
   1. Thickness: 3/4 inch, nominal.
D. Stile-and-Rail Moldings:
   1. Profile: As indicated on drawings.

2.06 WOOD VENEER PANELS

A. Description: Panels consisting of wood face veneers applied to cores; panel layup with face ply, back ply, and core of either single layer or odd number of inner plies, to produce balanced construction panel; comply with HPVA HP-1.
   1. Panels subject to size limitations, minimum thickness requirements, and fabrication tolerances of specified aesthetic grade and performance duty level in accordance with AWI 300 and ANSI/AWI 0641.
B. Hardwood Face Veneers Intended to Receive Transparent Finish:
   1. Species and Cut: As specified in this section with wood casework for transparent finish.
C. Back: Hardwood veneer.
D. Panel Cores:
   1. Veneer Core.
      a. Plies: 7-ply.

2.07 HDPL-CLAD PANELS

A. Description: Panels consisting of High-Pressure Decorative Laminate (HPDL) faces applied to cores; panel layup with face ply, back ply, and core of either single ply or odd number of inner plies, to produce balanced construction panel.
   1. Panels subject to size limitations, minimum thickness requirements, and fabrication tolerances of specified aesthetic grade and performance duty level in accordance with AWI 300 and ANSI/AWI 0641.
B. Flame Retardance: Provide flame-retardant-grade laminates where indicated on drawings.
C. High-Pressure Decorative Laminate (HPDL): Sheet consisting of fibrous material impregnated with thermosetting resins; bonded by high-pressure process.
D. HPDL Laminates Less than 0.08 inch Thick: Comply with ISO 4586-3.
   1. Horizontal Grades:
      a. HPDL HDS.
   2. Vertical Grades:
      a. HPDL VDS.
   3. Exposed Backer Materials:
      a. Same materials, thickness and color as laminate face.
   4. Concealed Backer Materials:
      a. Laminate materials as required for balanced construction panel and recommended by laminate manufacturer for application.
E. Panel Cores:
   1. Medium Density Fiberboard Core (MDF).

2.08 PANEL CORES

A. Medium Density Fiberboard (MDF):
   1. Description: Composite panel composed of cellulosic fibers, additives, and bonding system cured under heat and pressure; comply with ANSI A208.2.
   2. Grade: 155.
   3. Panel Thickness: 3/4 inch.
   4. Moisture Resistance: MR10; color-tinted to indicate moisture-resistance core.

5. No-Added Formaldehyde Based (NAUF) Resins: Comply with CARB (ATCM).

B. Hardboard (HDF):
1. Description: Panels manufactured from inter-felted lignocellulosic fibers consolidated under heat and pressure to 31 pcf density or greater; comply with ANSI A135.4.
2. Class: Tempered.
3. Nominal Thickness: 1/4 inch.
4. Applications: Interior back panels in semi-exposed locations.

2.09 CONCEALED CABINET BASE COMPONENTS

A. Cabinet Base Toe-Kick Subfronts:
1. Materials: Moisture-resistant wood boards.
2. Size: As indicated on drawings.
3. Finished Face of Toe Kick Subfronts: As indicated on drawings.

B. Cabinet Base Blocking and Stretchers:
1. Materials: Moisture-resistant wood boards.
2. Size: As indicated on drawings.

2.10 WOOD AND WOOD-BASED MATERIALS

A. Sustainability Characteristics:
1. See Section 01 60 00 - Product Requirements for sustainable product reporting requirements.

B. AWI 200 Wood Moisture Content Requirements:
1. Climate Zone 2: Between 6 and 10 percent.

C. AWI 300 General Requirements for Wood.
1. Provide wood that is sound, free of decay, shake, pith, wane, and warp.
2. Provide wood in accordance with AWI 300.

D. Plywood: Comply with PS 1.
1. Structural I, Grade C-D, Exposure I.

E. Wood Boards: Comply with PS 20.
1. Thickness: As indicated on drawings.

F. Moisture-Resistant Wood: Where moisture-resistant wood is specified or indicated on drawings for cabinet base components, provide wood with thickness swelling of not more than 5 percent when tested in accordance with ASTM D1037.

2.11 CABINET AND DRAWER HARDWARE

A. Hinges, Number of Hinges for Each Cabinet Door:
1. Door Heights Under 48 inches: Not less than two hinges per door.
2. Door Heights Between 48 inches and 84 inches: Not less than three hinges per door.
3. Door Heights Greater than 84 inches: Not less than four hinges per door.

B. Five Knuckle Hinges:
1. Material: Type 304 Stainless steel for flush-overlay door.
2. Height: 2.75 inches.
3. Grade: Comply with ANSI/BHMA A156.9 Grade 1.
4. Finish: 26S Brushed chrome

C. Cabinet Door Pulls:
1. Description: Back-mounted pulls.
2. Provide one pull for each drawer 24 inches or less in width.
3. Provide two pulls for each drawer over 24 inches in width.
4. Design: U-shape wire pulls.

5. Center-to-Center Mounting Dimension: 4 inches.
6. Length: 4 inches.
7. Material and Finish: Satin stainless steel.

D. Cabinet Magnetic Catches:
1. Description: Fastening devices with magnetic holding capacities that keep cabinet doors closed until pulling actions release doors for opening.
2. Provide one catch for each swinging door 48 inches and less in height.
3. Provide two catches for each swinging door over 48 inches in height.
4. Heavy Duty Magnetic Catches:
a. Comply with BHMA A156.9, B03172.
5. Material and Finish: Satin anodized aluminum.

E. Shelf Rests:
1. Description: Metal shelf rests for installation into prepared holes in substrate. Provide holes at nominal 1 inch spacing.
2. Comply with specified performance requirements.
3. Material and Finish: Steel with nickel-plated finish.

F. Drawer Slides:
1. Description: Hardware units that suspend drawers and provide controlled drawer sliding.
2. Comply with specified performance requirements.
3. Comply with BHMA A156.9, Heavy Duty Grade 1HD-100.
4. Features: Self-closing.
5. Mounting: Side-mounted self-closing.
6. Travel: Full extension.
7. Material and Finish: Steel with polished finish.

G. Keyed Locks with Dead Bolts:
1. Description: Keyed cylinder locks for securing cabinet doors.
2. Keying Action: Key projects and retracts dead bolts.
3. Mounting: Half-mortised into back of door or drawer front.
4. Interchangeable Cores: Provide interchangeable cores.
a. Two sets of four tumblers locking in opposite splines. Positive tumbler operations shall be accomplished by cam action without the aid of springs.
b. Master-keyed keying system as selected by Architect, and approved by the Owner.
5. Material and Finish: Satin stainless steel.

H. Sliding Glass Door Lock:
1. Adjustable ratchet-type lock with keyed cylinder and serrated-edge ratche plate for mounting to glass door. .
2. Interchangeable Cores: Same type as doors and drawers.
3. Mounting: surface mounted to glass.
4. Finish: Chrome plated on steel.
5. Master-keyed keying system as selected by Architect, and approved by the Owner.

I. Sliding Glass Display Cases and Hardware:
1. Track and carrier system for bi-passing sliding glass doors, designed to resist lifting doors out of tracks for secure storage.
2. Carriers at bottom of glass panels shall feature ball-bearing glides.
3. Tracks at top and bottom shall be double-channel aluminum or steel with satin finish.
4. Carriers to fit 1/4 inch thick tempered glass.

5. Finish: All satin anodized finish. Door lock finish shall be US 14 polished nickel.

J. Closet Rod Hanging Systems:
   1. Round tubing style; Heavy duty, US 32D stainless steel with bright finish. 0.087 inch wall thickness, minimum. Provide wall-mount flanges for screw attachment to substrate surface with multiple screws in finish to match pole.

K. Garment Hooks:
   1. Description: Devices with one or more arms projecting from attachment bases; for hanging garments.
   2. Mounting: Surface mounted by not less than two tamper-proof screws.
   3. Rated to support 90 pounds minimum.
   4. Material and Finish: Satin stainless steel.

2.12 CASEWORK ACCESSORY COMPONENTS

A. Glass and Glazing Applications:
   1. Glass lites in cabinet doors, where indicated on drawings.
   2. Frameless sliding glass doors, where indicated on drawings.
      a. Exposed Edges and Corners: Ground and polished.
   3. Glass shelves, where indicated on drawings.
      a. Exposed Edges and Corners: Ground and polished.
   4. Glass: Clear, tempered, safety glass.
      a. ASTM C1036, Type I transparent flat; Class I clear.
      b. ASTM C1048, Kind FT fully tempered; Condition A uncoated; Quality Q3.
      c. Safety glass complying with ANSI Z97.1 Class A.
      d. Thickness: 1/4 inch nominal, minimum.

B. Aluminum Trim and Mouldings: Extruded, alloy 6063 T5.

C. Grommets: Plastic, with matching slotted caps; round.
   1. Applications: Where indicated on drawings.
   2. Shape: Round.
   3. Inside Diameter: 2 inches.
   4. Color: Black.

2.13 ACCESSORIES

A. Fasteners: Size and type to suit application.

B. Concealed Joint Fasteners: Threaded steel.

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel finish in exposed locations.

2.14 COUNTERTOP BRACKETS

A. Countertop Support Brackets: Fixed, L-shaped, face-of-stud mounting.
   1. Materials: Aluminum sections.
      a. Support Length: Depth of counter projection, less 3 inches.
      b. Height: Manufacturer's standard size, based on support length.
   2. Subject to compliance with these specifications, provide products of one of the following:
      a. Rakks/Rangine Corporation; EH Series Brackets: www.rakks.com/#sle.
      b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00 .Substitutions: See Section 01 60 00 - Product Requirements.

B. Vanity Support Brackets: Fixed, ADA-compliant, face-of-stud mounting. Designed for attachment of sloping apron panel at kneespace.
   1. Material and Shape: Steel; formed compound shapes.
      a. Finish: Manufacturer's standard, factory-applied, textured powder coat.
   2. Subject to compliance with these specifications, provide products of one of the following:
      a. A&M Hardware, Inc; ADA Vanity Brackets: www.aandmhardware.com/#sle.
      b. Rakks/Rangine Corporation; ADA Compliant EH-1818-LV Vanity Supports: www.rakks.com/#sle.
      c. Hafele Corporation: ADA compliant Vanity Bracket.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Countertops: See Section 12 36 00.

2.15 FABRICATION

A. Shop-fabricate casework to dimensions, profiles, and details indicated on drawings.
   1. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain measurements and verify dimensions and shop drawing details for accurate fit.
   2. Where sequence of measuring substrates before fabrication would delay the project, proceed with fabrication (without field measurements) and provide ample borders and edges to allow for subsequent scribing and trimming of woodwork for accurate fit.

B. Fabricate to maximum extents plausible, including doors, drawers, and hardware; fabricate units in sizes transportable through building openings.

C. Ease sharp edges of solid wood stiles and rails.

D. When necessary to cut and fit on site, provide materials with sufficient allowance for cutting.

E. Provide cutouts for plumbing fixtures and electrical or communications junction boxes, conduits, and other recessed equipment; verify locations of cutouts from on-site dimensions. Sand and seal cut edges.

F. Edgebanding: Apply where specified; do not use more than one piece for any single length.

G. Hardware: Install hardware in accordance with hardware manufacturer's written instructions; use fasteners supplied by hardware manufacturer.

H. Glazing: Install glass products with dry glazing method using soft, closed-cell gaskets in accordance with GANA (GM).

I. Fabrication Tolerances: Comply with specified performance requirements.

2.16 SHOP FINISHING

A. Surface Preparation: Comply with:
   1. ANSI/AWI 0400 for specified aesthetic grade.

B. Shop Finishing: Shop finish architectural wood casework.
   1. Comply with ANSI/AWI 0400 for specified aesthetic grade.

C. Transparent Finish System:
   1. MPI (APSM) Gloss Level Measured at 60-Degree Angle:
      a. Gloss Level 5.
   2. ANSI/AWI 0400 Finish System: TR-1 - Lacquer, Nitrocellulose.
   3. Stain: As selected by Architect from stain manufacturer's full range of colors to match other building components.

PART 3 EXECUTION

3.01 EXAMINATION

A. Carefully examine installation areas with Installer present, for compliance with requirements affecting work performance.

B. Verify HVAC systems are operational and sufficient temperature and humidity control is achieved prior to delivering materials or starting installation. Commencing delivery or installation signifies the installer's acceptance of ambient conditions and responsibility for damage due to humidity or temperature being out of recommended range.

C. Verify that field measurements, surfaces, substrates, structural backing and support, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions prior to beginning work.

D. Verify casework and materials required for installation have been delivered, handled and stored as specified.

E. Verify wood blocking that provides casework backing is installed as indicated on drawings.

F. Verify location and sizes of rough-in plumbing and rough-in electrical associated with work of this section.

G. Verify location and sizes of cutouts for appliances and special equipment to be mounted in or adjacent to casework.

H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Layout installation by marking extents of each item, and anchoring / fastening locations coordinated with blocking or other structural support.
   1. Marks shall be covered up and hidden by installation.
   2. Locate areas out-of-level and correct.
   3. Protect adjacent substrates, installed work and existing items from damage by construction operations with temporary effective means.

B. Acclimate casework to environments indicated for installation.

3.03 INSTALLATION

A. Install and secure work of this section in accordance with specified performance requirements.

B. Install work of this section rigid, plumb, and level and in accordance with fabricator's documented instructions; secure casework as indicated on drawings.
   1. Align and secure adjoining cabinet units with fasteners in concealed locations.

C. Fire Retardant Woodwork: Handle, store, and install in accordance with manufacturer's directions required to meet required classification or rating. Provide special fasteners, moldings, adhesives and other accessories as tested and listed for type of fire retardant woodwork indicated.

D. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces. For exposed nailing work, set nails for putty.
   1. Where fasteners are highly visible, pay close attention to ensuring that fasteners and plugs are aligned and equally spaced.

E. Install without distortion so that doors will fit openings properly and be accurately aligned.
   1. Adjust hardware to center doors in openings and to provide unencumbered operation.
   2. Complete the installation of hardware and accessory items as indicated.
   3. Maintain veneer sequence matching (if any) of casework with transparent finish.

F. Exposed Wood: Cleats, nailers and other required supports shall be finished lumber.

G. Install scribe fillers to close gaps between casework and adjacent walls. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
H. See Section 08 80 00 for site-glazing of glass applications installed in casework components.

3.04 TOLERANCES

A. Comply with AWI performance requirements for PREMIUM grade installation tolerances.
B. Maximum out-of-plane offset between cabinets (flushness): 0.016 inch at flat surfaces, 0.031 inch at shaped surfaces.
C. Maximum gap at field joints: 0.016 inch, limited to 30 percent of joint length.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. AWI QCP Inspection Services: Provide AWI QCP installation inspection services.
   1. Inspect for compliance with contract documents; on subjects contract documents are silent, inspect for compliance with specified AWI aesthetic grade.

3.06 ADJUSTING

A. Adjust hardware for smooth operation in accordance with hardware manufacturer's documented instructions.

3.07 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
B. Clean exposed surfaces of casework, shelving, and hardware.
C. Keep the premises in a neat, safe, and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut ends, and debris.
   1. At the end of each working day, and more often if necessary, thoroughly sweep surfaces where refuse from this portion of the work has settled.
   2. Remove the refuse to the area of the job site set aside for its storage.
   3. Upon completion of this portion of the work, thoroughly clean all surfaces in rooms where cutting or machining has occured..

3.08 PROTECTION

A. Protection: Installer of architectural woodwork shall advise Contractor of procedures required to protect architectural woodwork during remainder of construction period to ensure that work will be without damage or deterioration at time of acceptance.
B. Protect installed casework from subsequent construction operations until Date of Substantial Completion or Owner Occupancy, whichever occurs first.

END OF SECTION

SECTION 06 83 16
FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Fiberglass reinforced plastic (FRP) panels.
   2. Trim.
   3. Accessories required to provide a complete installation, including but not limited to fasteners, adhesives, and sealants.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.
B. CDPH. California Department of Health: www.cdph.ca.gov.
C. FRP. Fiber-reenforced plastic panels.
D. USDA. U.S. Department of Agriculture: www.fsis.usda.gov.
E. VOC. Volatile Organic Compound.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
C. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
D. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
E. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
G. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
H. FDA Food Code - Chapter 6 - Physical Facilities.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Product data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
   2. Samples: Submit two samples 10 by 10 inch in size illustrating material and surface design of panels.
   3. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

a. Include documentation of:
1) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Methods and precautions regarding cleaning materials and methods.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
a. See Section 01 60 00 - Product Requirements, for additional provisions.
b. Extra Panels: Quantity equal to 5 percent of total installed.
4. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface, and as recommended by manufacturer. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

1.06 WARRANTY

A. Provide longest available manufacturer's warranty against material and workmanship defects. Warranty periods of less than two years are not accepta

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fiberglass Reinforced Plastic Panels: Subject to compliance with these specifications, provide products of one of the following:
1. Crane Composites, Inc; Glasbord: www.cranecomposites.com.
2. Nudo Products, Inc; Fiberlite: www.nudo.com.
3. Panolam Industries International, Inc; Panolam FRP: www.panolam.com.
4. Other manufacturer's products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: see Section 01 25 00 - Substitution Procedures.

2.02 PANEL SYSTEMS

A. Wall Panels:
1. Panel Size: As indicated on Drawings. If not indicated then 4 by 8 feet.
2. Panel Thickness: .090 inch.
3. Surface Design: Pebbled.
4. Color: As selected by Architect from manufacturer's full range.
5. Attachment Method: Nylon rivets, with aluminum edge trim.

2.03 MATERIALS

A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
1. Surface Burning Characteristics: Maximum flame spread index of 200 and smoke developed index of 450; when system tested in accordance with ASTM E84.
2. Impact Strength: Greater than 4 ft lb force per inch, when tested in accordance with ASTM D256.
3. Flexural Strength: 14,000 psi minimum, per ASTM D790.
4. Surface Characteristics and Cleanability: Provide products that are smooth, durable, and easily cleanable, in compliance with FDA Food Code, Chapter 6 - Physical Facilities.
5. Water Absorption: Not more than 0.20 percent when tested per ASTM D570.

B. Trim: Aluminum; Extruded 6063-T5, with satin finish.
C. Fasteners: Type(s) recommended by manufacturer for applicable substrate(s) .
D. Adhesive: Low VOC type(s) recommended by panel manufacturer for applicable substrate(s).
E. Sealant: Low VOC type(s) recommended by panel manufacturer for applicable substrate(s); color matching panel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.
B. Verify that substrate conditions are ready to receive the work of this section. Commencement of work constitutes acceptance of substrates.

3.02 INSTALLATION - WALLS

A. Install panels in accordance with manufacturer's instructions.
B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
C. Pre-drill fastener holes in panels, 1/8 inch greater in diameter than fastener, spaced as indicated by panel manufacturer.
D. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
E. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
F. Install panels with manufacturer's recommended gap for panel field and corner joints.
G. Drive fasteners to provide snug fit, and do not over-tighten.
H. Place trim on panel before fastening edges, as required.
I. Fill channels in trim with sealant before attaching to panel.
J. Install trim with adhesive and screws or nails, per requirements of specific project conditions.
K. Seal gaps at floor, ceiling, dissimilar surfaces, fixtures, penetrations, and between panels with applicable sealant to prevent moisture intrusion.
L. Remove excess sealant after paneling is installed and prior to curing.

3.03 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Clean installed work. Keep premises in neat, safe, and orderly condition at all times during execution of this portion of the work, free from accumulaton of cut ends, and debris.

3.04 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 07 00 01
WATERPROOFING, DAMPPROOFING, AND CAULKING TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1 - 8, 10, and 11, as most recently amended.

B. Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid deposit specified therein.

C. Every Trade Bid for work under this section shall be on the form in this project manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Waterproofing, Dampproofing and Caulking Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. Coordinate work with that of all other trades affecting or affected by work of this section. Cooperate with such trades to ensure the steady progress of all work under the contract.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the subcontractor or an entity engaged by the subcontractor, either as an employee or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, notify the Construction Manager of the planned work not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant, dedicated fire watch who is not otherwise employed as active installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this section includes furnishing and installing all waterproofing, dampproofing, and sealants that are not specifically indicated to be furnished or installed by other trades, as shown on drawings, as described in specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 07 00 01 or the abbreviation "SC-WD&C".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:
   1. Section 07 11 13 - Bituminous Dampproofing.
   2. Section 07 13 00 - Sheet Waterproofing.
   3. Section 07 14 00 - Fluid-Applied Waterproofing.
   4. Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers.
   5. Section 07 91 00 - Preformed Joint Seals.

D. This Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Commissioning Sections 01 91 13 - MEP Commissioning Requirements and 01 91 19 - Building Envelope Commissioning: list of items to be commissioned and requirements for cooperation with the Commissioning Agent; and required field testing.
   2. Section 03 30 00 - Cast-in-Place Concrete: substrate for application of waterproofing and dampproofing; provision and installation of under-slab vapor retarder to be sealed to the work of this section.
   3. Section 03 45 00 - Precast Architectural Concrete.
   4. Section 04 20 00 - Unit Masonry: Thru-wall flashings to be sealed to VR/AIB system, waterproofing and dampproofing, and coordination of product selection to provide materials approved as part of an NFPA 285 assembly.
   5. Section 04 72 00 - Cast Stone Masonry .
   6. Section 06 10 00 - Rough Carpentry: Blocking to receive VR/AIB products.
   7. Section 07 42 13 - Metal Wall and Soffit Panels: Coordination of product selection to provide materials approved as part of an NFPA 285 assembly.
   8. Section 07 42 14 - Metal Composite Material Wall Panels: Coordination of product selection to provide materials approved as part of an NFPA 285 assembly
   9. Section 07 54 00 - Thermoplastic Membrane Roofing: Roofing air and vapor retarder to be sealed to wall VR/AIB system.
   10. Section 07 92 00 - Joint Sealants.
   11. Section 08 11 13 - Hollow Metal Doors and Frames.
   12. Section 08 31 00 - Access Doors and Panels.
   13. Section 08 34 53 - Bullet Resistant Entry Systems.
   14. Section 08 44 35 - Fire-Rated Glazed Assemblies.
   15. Section 08 43 13 - Aluminum-Framed Storefronts.
   16. Section 08 44 13 - Glazed Aluminum Curtain Walls.
   17. Section 08 51 13 - Aluminum Windows.
   18. Section 08 56 59 - Service and Teller Window Units.
   19. Section 09 21 16 - Gypsum Board Assemblies: substrate to receive VR/AIB products.
   20. Division 22: Plumbing sections; for underground piping penetrations of dampproofing and waterproofing to be sealed.
   21. Division 31: Earthwork sections: placement of backfill against installed dampproofing and waterproofing.
   22. Division 32: Site Utilities sections, for underground conduit penetrations of dampproofing and/or waterproofing to be sealed.

E. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

F. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Bidder shall review all remaining Drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.

G. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls or additional information.

H. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls or additional information.

I. Cutting and Patching:
   1. This Trade Contractor shall perform all cutting and coring required to complete the work of all sections listed as part of this Trade Bid, except as specifically indicated in the respective Trade Contract sections. Where any of the sections listed as part of this Trade Bid indicate that cutting and coring shall be performed by others, the cost of such cutting and coring necessary for the work of this section shall be borne by this Trade Contractor.
   2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
   3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
   4. Any and all cutting of structural members, including floor slabs, shall require approval of the Structural Engineer of Record; see Structural Drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those indicated on Structural Drawings, obtain approval from Structural Engineer of Record.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See each individual technical specification section listed above for required product information, samples, shop drawings, and other submittals required.

1.05 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, the Waterproofing, Dampproofing, and Caulking Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan

identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Waterproofing, Dampproofing, and Caulking Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.06 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.07 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section, and other components of the exterior walls and roof assemblies.

B. See Section 01 40 00 - Quality Requirements for exterior building envelope mock-up requirements.

1.08 WARRANTY

A. See Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. See each individual technical specification section listed above for specific warranty requirements.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS)

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

3.01 CLEANING

A. Waterproofing, Dampproofing, and Caulking Trade Contractor shall be responsible for cleaning up Waterproofing, Dampproofing, and Caulking Trade Contractor's own work at the end of each day, and depositing waste and debris created by Waterproofing, Dampproofing, and Caulking Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

SECTION 07 00 02
ROOFING AND FLASHING TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1 - 8, 10, and 11, as most recently amended.

B. Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid deposit specified therein.

C. Every Trade Bid for work under this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Roofing and Flashing Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the subcontractor or an entity engaged by the subcontractor, either as an employee or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, notify the Construction Manager of the planned work not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant, dedicated fire watch who is not otherwise employed as active installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this section includes furnishing and installing complete roofing and flashing systems including all accessories necessary for a complete installation, as shown on drawings, as described in specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 07 00 02 or the abbreviation "SC-ROOF".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:

1. Section 07 54 00 - Thermoplastic Membrane Roofing.
2. Section 07 72 00 - Roof Accessories.

D. The work of the Roofing and Flashing Trade Contractor shall include part of the scope of each of the following sections:
   1. Section 05 52 13 - Pipe and Tube Railings: for Roof Edge Protection Rail (Roof Edge Non-Penetrating Guardrail System) to be furnished and installed by this Trade Contractor.
   2. Section 06 10 00 - Rough Carpentry: Blocking and grounds related to roof curbs and roof edges.
   3. Section 07 21 00 - Thermal Insulation: rigid board insulation related to roofing work.
   4. Section 07 21 19 - Foamed-In-Place Insulation: foamed-in-place insulation at junctions and joints at changes in plane and edges of roof insulation.
   5. Section 07 62 00 - Sheet Metal Flashing and Trim: for flashing and trim provided by this Trade Contractor and furnished to others for installation.
   6. Section 07 92 00 - Joint Sealants: spray foam for filling and sealing cracks in insulation board products.

E. Work furnished by this Trade Bid Section for installation by other sections include:
   1. Sheet metal through-wall flashings at masonry walls occurring above adjacent roofing. Furnish through-wall flashing materials to Masonry Trade Contractor for installation. Roofing Trade Contractor shall furnish and install exposed counterflashing and reglets.
   2. Sheet metal through-wall flashings at non-masonry walls occurring above adjacent roofing: furnish through-wall flashing material to Construction Manager for installation. Roofing Trade Contractor shall furnish and install exposed counterflashing and reglets.

F. The Roofing and Flashing Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Commissioning Sections 01 91 13 - MEP Commissioning Requirements and 01 91 19 - Building Envelope Commissioning: list of items to be commissioned and requirements for cooperation with the Commissioning Agent; and required field testing.
   2. Section 04 20 00 - Unit Masonry: Through-wall flashings and step flashings to be incorporated into masonry.
   3. Section 04 72 00 - Cast Stone Masonry: Through-wall flashings and step flashings to be incorporated into masonry.
   4. Section 05 50 00 - Metal Fabrications: Roof ladders requiring anchoring at roof surface and roof edges.
   5. Section 07 42 13 - Metal Wall and Soffit Panels: coordination of roof edge flashings and connection to wall finish.
   6. Section 07 42 14 - Metal Composite Material Wall Panels: coordination of roof edge terminations, flashings, connections, and transitions between roofing systems and MCM panel systems.
   7. Division 22 Plumbing sections: vents through roof and other penetrations requiring flashing.
   8. Division 23 HVAC sections: Rooftop equipment including but not limited to: air handlers, exhaust fans, gravity vents, which include curbs and piping penetrations requiring flashing and penetration sealing.
   9. Division 26 Electrical sections: Lightning protection systems, requiring attachment to roof and penetrations requiring flashing and sealing.

G. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

H. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Bidder shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.

I. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

J. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

K. Cutting and Patching:
   1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective Trade Contract sections. Where any of the sections listed as part of this Trade Bid indicate that cutting and coring shall be performed by others, the cost of such cutting and coring necessary for the work of this section shall be borne by this Trade Contractor.
   2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
   3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
   4. Any and all cutting of structural members, including floor slabs, shall require approval of the Structural Engineer of Record; see Structural Drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those indicated on Structural Drawings, obtain approval from Structural Engineer of Record.

L. Demolition Responsibilities: The work of the Roofing and Flashing Trade Contractor shall include demolition of roofing materials in areas of selective demolition, as shown on or reasonably inferred from drawings, and provision of weather tight temporary flashings at extent of existing construction to remain.
   1. See Section 02 41 00 - Demolition for additional requirements.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section for reference standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements: for submittal procedures.

B. Construction Submittals: See each individual technical specification section listed above for required Product Information, Samples, shop drawings, and other submittals required.

C. Closeout Submittals:
   1. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

2. See each individual technical specification section listed above for specific warranty requirements, and special requirements listed above in this section.
3. Special Requirements: The applicator shall supply the Owner with a three-year warranty separate from the manufacturer warranty, as described in each individual technical specification section. This warranty shall cover the entire roofing system on the project. In the event any work related to roofing, flashing, or metal is found to be defective, installed improperly, or otherwise not in accordance with the Contract Documents within this warranty term, the Roofing and Flashing Trade Contractor shall repair that defect at no cost to the Owner. This warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer and Architect. The form of guaranty is annexed to this section of the specifications.

1.06 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, the Roofing and Flashing Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Roofing and Flashing Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.07 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.08 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section, and other components of the exterior walls and roof assemblies.

B. See Section 01 40 00 - Quality Requirements for exterior building envelope mock-up requirements.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS)

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

3.01 CLEANING

A. Roofing and Flashing Trade Contractor shall be responsible for cleaning up Roofing and Flashing Trade Contractor's own work at the end of each day, and depositing waste and debris created by Roofing and Flashing Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this Section shall be included in the Waterproofing, Dampproofing, and Caulking Trade Bid. Refer to Section 07 00 01 - Waterproofing, Dampproofing, and Caulking Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and erecting the following dampproofing work:
   1. Cold-applied bituminous dampproofing at foundation walls as indicated on Drawings and specified herein.
   2. Protection boards.
   3. Accessories required for a complete installation, including but not limited to substrate primers, adhesives, and sealants required for the installation of the work of this Section.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.

B. CARB. California Air Resources Board; www.arb.ca.gov.

C. NRCA. National Roofing Contractors Association; www.nrca.net.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

C. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.

D. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

E. ASTM D4263 - Standard Practice for Indicating Moisture in Concrete by the Plastic Sheet Method.

F. NRCA (WM) - The NRCA Waterproofing Manual.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide properties of primer, bitumen, and mastics.
   2. Subcontractor's written acknowledgement of inspection of substrate conditions, and acceptance of the substrate. Submit prior to application of self-adhered membrane.
   3. Installer qualifications: Certify that the installer is approved, trained and certified by the manufacturer as an installer of the proposed systems. List completed projects.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Waterproofing, Dampproofing, and Caulking Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to

the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

a. Include documentation of:

1) Environmental Product Declarations (EPD).

1.06 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish system materials from one manufacturer for entire Project, unless otherwise acceptable to Architect.

B. Certifications: Verify products are compatible with each other and with spray foam insulation.

C. Refer to Section 01 91 19 - Building Envelope Commissioning for requirements association with building envelope commissioning applicable to this Section.

1.07 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.

1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.08 PRODUCT DELIVERY AND STORAGE

A. Comply with Section 01 60 00 - Product Requirements, fabricator’s instructions and recommendations, and as follows:

1. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer’s instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of damaged materials in accordance with applicable regulations.
2. Store in a heated room and keep container covered when not in use.
3. Sequence deliveries to avoid delays but minimize on-site storage.

1.09 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

B. Ambient Conditions: Perform work only when existing and forecast weather conditions are within the limits established by the manufacturer of the materials used.

C. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive product.

D. Commencement of the installation of waterproofing shall signify that the subcontractor has inspected the substrate conditions and found them to be acceptable per the requirements of the manufacturer.

E. Contractor to confirm compatability of existing dampproofing with new dampproofing.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these specifications, provide products of one of the following:

1. Karnak Corporation: www.karnakcorp.com.
2. Mar-flex Waterproofing & Building Products: www.mar-flex.com.
3. W. R. Meadows, Inc; Sealmastic Emulsion Type 1 (spray-grade): www.wrmeadows.com. (Basis of Design)
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 BITUMINOUS DAMPPROOFING

A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
   1. Asphalt-Base Emulsion for Metal Protective Coating: ASTM D1187/D1187M, Type I - Continuous water exposure within few days after drying or Type II - Continuous weather exposure after drying.
   2. Emulsified Asphalt for Roofing Protective Coating: ASTM D1227/D1227M, Type II, Class 1 - Mineral colloid emulsifying agents with non-asbestos fibers.
   3. VOC Content: Not more than permitted by local, State, and federal regulations.
   4. Applied Thickness: 1/16 inch, minimum, wet film.

2.03 BITUMEN MATERIALS

A. Cold Asphaltic Type:
   1. Bitumen: Emulsified Asphalt, ASTM D1227/D1227M, with fiber reinforcement other than asbestos, Type II, Class 1 or 2.
   2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.
   3. Sealing Mastic: Asphalt roof cement.
   4. Subject to compliance with these specifications, provide products of one of the following:
      a. Product: MasterSeal 610 manufactured by BASF Building.
      b. Product: Dehydratine 75 manufactured by Tamms (Euclid Chemical Company).
      c. W.R. Meadows, Inc; Sealmastic Emulsion Type I (spray-grade): www.wrmeadows.com. (Basis of Design)
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.04 ACCESSORIES

A. Asphalt coated glass-reinforced fabric: 8 inches wide for joint reinforcement.
B. Protection Board: Rigid insulation; see Section 07 21 00 - Thermal Insulation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.
B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
C. Verify that items penetrating surfaces to receive dampproofing are securely installed.
D. Test for surface moisture per ASTM D4263.
E. Submit written acceptance of substrate surfaces and conditions prior to commencing dampproofing application.
F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATION

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure intended performance of dampproofing.
B. Apply dampproofing where indicated on Drawings.
C. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
D. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced", by embedding an 8 inch

wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

E. Apply dampproofing to provide continuous plane of protection on exterior face of inner wythe of exterior masonry cavity walls. Coordinate continuous edge seal with adjacent materials.
F. Apply dampproofing to provide continuous plane of protection on interior face of above-grade, exterior concrete and masonry walls as indicated, unless walls are indicated to receive direct application of paint.
G. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
H. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
I. Apply bitumen in two coats, continuous and uniform, at a rate matching manufacturer recommendations.
J. Apply from zero inches below finish grade elevation down to face of footing, six inches below top of footings.
K. Seal items watertight with mastic, that project through dampproofing surface.

3.03 REPAIR AND PROTECTION

A. Visually inspect installed dampproofing for voids, damage, or rupture. Repair defects in accordance with manufacturer's published application specifications.
B. Clean misplaced dampproofing materials from adjacent surfaces with solvent recommended by manufacturer.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION

SECTION 07 13 00
SHEET WATERPROOFING

PART 1 GENERAL

1.01 TRADE CONTRACT REQUIRED

A. The work of this Section shall be included in the Waterproofing, Dampproofing, and Caulking Trade Bid. Refer to Section 07 00 01 - Waterproofing, Dampproofing, and Caulking Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and erecting the following sheet waterproofing work:
   1. Sheet waterproofing for vertical installation at foundation walls, as indicated on drawings.
   2. Blind-side waterproofing below slabs and foundation, as indicated on drawings.
   3. Waterstops for casting into (when required by waterproofing manufacturer) shall be furnished to Section 03 30 00 - Cast-in-Place Concrete subcontractor for installation with the concrete work.
   4. Below-grade waterproofing accessories.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASTM - American Society for Testing and Materials.

B. NRCA - National Roofing Contractors Association.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

C. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

D. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

E. ASTM D5295/D5295M - Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems.

F. ASTM D5385/D5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.

G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

H. NRCA (WM) - The NRCA Waterproofing Manual.

1.05 SUBMITTALS

A. Construction Submittals
   1. See Section 01 30 00 - Administrative Requirements for submittal procedures.
   2. Product Data: Provide data for membrane.
   3. Certificate: Certify that products meet or exceed specified requirements, and are compatible with adjacent materials.
   4. Subcontractor's written acknowledgement of substrate conditions, and acceptance of substrate as suitable for application of waterproofing.
   5. Manufacturer's written inspection report and acceptance of waterproofing installation. Submit within five days of waterproofing application.

B. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional

prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Waterproofing, Dampproofing, and Caulking Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Environmental Product Declarations (EPD).
        2) Health Product Declarations (HPD).

C. Closeout Submittals
1. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
2. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.

1.06 QUALITY ASSURANCE

A. See Section 01 91 19 - Building Envelope Commissioning for requirements associated with building envelope commissioning applicable to this section.
B. Single Source Responsibility: Furnish system materials from one manufacturer for entire Project, unless otherwise acceptable to Architect.
C. Certifications: Verify products are compatible with each other and with specified underslab vapor barrier, insulation, and dampproofing.

1.07 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.
1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.08 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.
B. Ambient Conditions: Perform work only when existing and forecast weather conditions are within the limits established by the manufacturer of the materials used.
1. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive the air and vapor barrier membrane.
C. Commencement of the installation of waterproofing shall signify that the subcontractor has inspected the substrate conditions and found them to be acceptable per the requirements of the manufacturer.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water.

PART 2 PRODUCTS

2.01 SHEET WATERPROOFING APPLICATIONS

A. Self-Adhering Modified Bituminous Sheet Membrane: use at vertical walls and formed concrete surfaces.
1. Location: At vertical walls, where indicated on drawings.
B. Blind-Side Self-Adhering Waterproofing:
1. Location: Under slabs and footings.

2.02 SHEET WATERPROOFING MATERIALS

A. Self-Adhered Modified Bituminous Sheet Membrane:

1. Thickness: 60 mil, 0.060 inch, minimum.
2. Sheet Width: 36 inches, minimum.
3. Tensile Strength:
   a. Film: 5,000 psi, minimum, measured in accordance with ASTM D882 and at grip-separation rate of 2 inches per minute.
   b. Membrane: 325 psi, minimum, measured in accordance with ASTM D412 Method A.
4. Elongation at Break: 300 percent, minimum, measured in accordance with ASTM D412.
5. Water Vapor Permeance: less than 0.1 perm, maximum, measured in accordance with ASTM E96/E96M.
6. Hydrostatic Pressure Resistance: Membrane resists leakage for at least one hour from pressure equivalent to 200 feet head of water applied in accordance with test method ASTM D5385/D5385M.
7. Puncture Resistance: 50 pounds, minimum.
8. Peel Strength: 9 pounds, minimum.
9. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.
10. Products:
    a. Carlisle Coatings & Waterproofing Inc; MiraDRI 860/861: www.carlisleccw.com.
    b. GCP Applied Technologies; Bituthene System 4000: www.gcpat.com.
    c. Henry Company; Blueskin WP 200: www.henry.com.
    d. W.R. Meadows, Inc; MEL-ROL: www.wrmeadows.com.
    e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Blind-Side Self-Adhering Sheet Membrane: Comprised of HDPE, TPO, or polypropylene, with spun polypropylene fabric facing, and pressure sensitive adhesive and weather resistant protective coatings.
   1. Thickness: 150 mil, 0.150 inch, minimum.
   2. With compatible waterstop devices recommended by manufacturer for non-moving construction joints.
   3. Tensile Strength: 2100 psi minimum, measured in accordance with ASTM D412.
   4. Ultimate Elongation: 400 percent minimum, measured in accordance with ASTM D412.
   5. Water Vapor Permeability: less than 0.01 perm, measured in accordance with ASTM E96/E96M.
   6. Lap Peel Adhesion: 5.6 pounds minimum.
   7. Peel Adhesion to Concrete: Greater than 5 pounds.
   8. Puncture Resistance: 210 pounds minimum.
   9. Subject to compliance with these specifications, provide products of one of the following:
      a. Carlisle Coatings & Waterproofing Inc; Product: Miraply-H: www.carlisleccw.com.
      b. GCP Applied Technologies; Product: Preprufe 300R: www.gcpat.com.
      c. Henry Company; PreSeal 435: www.henry.com.
      d. W. R. Meadows, Inc; Product: Mel-Rol Precon: www.wrmeadows.com.
      e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

10. Unless confirmed by self-adhering sheet membrane manufacturer that product is suitable for direct contact with modified bitumen, provide recommended transition membrane or compatible detailing product between self-adhering sheet membrane and modified bitumen.

2.03 ACCESSORIES

A. Seaming Materials: As recommended by membrane manufacturer.

B. Membrane Sealant: As recommended by membrane manufacturer.

C. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.

D. Protection Board: Rigid insulation; see Section 07 21 00 - Thermal Insulation.

E. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.

1. Composition: Dimpled polystyrene, polyethylene, or polypropylene core; polypropylene filter fabric. Provide products as recommended in writing by manufacturer specifically for vertical and horizontal applications.
2. Products:
    a. Carlisle Coatings & Waterproofing Inc; Mira DRAIN: www.carlisleccw.com.
    b. GCP Applied Technologies;; Hydroduct: www.gcpat.com.
    c. W.R. Meadows, Inc; Mel-Drain: www.wrmeadows.com/#sle.
    d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
3. Compressive strength and thickness as recommended by manufacturer for vertical and horizontal applications. Values stated are minimums.
4. Compressive strength: 15,000 psf minimum, per ASTM D1621.

F. Cant Strips: Premolded composition material approved or recommended by waterproofing manufacturer.

G. Surface Conditioner: Sheet waterproofing manufacturer’s recommended water-based latex conditioner specifically formulated to promote adhesion, and compatible with membrane.

H. Adhesives: As recommended by membrane manufacturer.

I. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting work.

B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.

C. Verify that items penetrating surfaces to receive waterproofing are securely installed.

D. Submit written acceptance of substrate surfaces and conditions prior to commencing waterproofing application.

3.02 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

D. Seal cracks and joints with sealant and nonrigid filler, using depth to width ratio and procedures recommended by sealant and waterproofing manufacturers.

E. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

F. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate in accordance with ASTM D5295/D5295M.
   1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease and oil.
   2. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in referenced standard.
   3. Test concrete surfaces as described in referenced standards, and verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.03 INSTALLATION - MEMBRANE

A. General: Install Sheet Waterproofing according to the Drawings, approved submittals, manufacturer's instructions, and as follows:
   1. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
   2. Roll out membrane, and minimize wrinkles and bubbles.
   3. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.
   4. Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing and dampproofing. At slab-on-grade, leave exposed surface suitable for the attachment / sealing of under-slab vapor barrier.
   5. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
   6. If required by manufacturer's installation requirements, provide waterstops to Cast-In-Place Concrete subcontractor for placement with the pour, and review manufacturer's installation instructions.

B. Arrange for manufacturer's technical representative to visit site to inspect installation of waterproofing within five days of application. Submit manufacturer's written acceptance of waterproofing systems prior to covering with drainage panel, insulation, other overlying materials, and/or backfilling.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

A. Place drainage panel directly against exposed membrane areas, butt joints, place to encourage drainage downward; scribe and cut boards around projections, penetrations, and interruptions.

B. Coordinate installation of rigid insulation protection board immediately following installation of drainage panels and prior to backfilling.

3.05 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane until concrete is poured.

B. Protect installed waterproofing from damage due to harmful weather exposures, physical abuse, or other causes.
   1. Provide temporary coverings or enclosures where waterproofing is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

SECTION 07 14 00
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Waterproofing, Dampproofing, and Caulking Trade Bid. See Section 07 00 01 - Waterproofing, Dampproofing, and Caulking Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and erecting the following waterproofing work:
   1. Fluid-Applied Waterproofing at basement wall conditions.
   2. Cold-applied rubberized asphalt waterproofing.
   3. Waterstops to be provided to Section 03 30 00 - Cast-in-Place Concrete contractor for installation with the concrete work.
   4. Cant strips and other accessories required for a complete installation.
   5. Blindside waterproofing at elevator pit to be provided by Section 03 30 00 - Cast-in-Place Concrete.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASTM. American Society for Testing and Materials; www.astm.org.

B. NRCA. National Roofing Contractors Association: www.nrca.net.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASTM C836/C836M - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.

C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

D. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

E. NRCA (WM) - The NRCA Waterproofing Manual.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide data for membrane and joint and crack sealants.
   2. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.
   3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager and Waterproofing, Dampproofing, and Caulking Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

a. Include documentation of:
   1) Environmental Product Declarations (EPD).
   2) Health Product Declarations (HPD).

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Warranty Documentation:
      a. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
      b. Submit installer's documentation that installation complies with warranty conditions for the field-applied waterproofing.

1.06 FIELD CONDITIONS

A. Ambient Conditions: Perform work only when existing and forecast weather conditions are within the limits established by the manufacturer of the materials used.

B. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive product.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Installer Warranty: Provide five year warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.01 FLUID-APPLIED WATERPROOFING APPLICATIONS

A. Blind side of foundation walls which are retaining earth above the adjacent slab.
   1. Locations: Elevator Pit and Mechanical Pump Room.

2.02 FLUID-APPLIED WATERPROOFING MATERIALS

A. Cold-Applied Waterproofing: Suitable for installation on concrete and concrete masonry.
   1. Cured Thickness: 45 mil, 0.045 inch, minimum.
      a. Additional layer of .030 inch, may be required if first coat sags or slumps due to temperature or substrate conditions. Satisfy all manufacturer's recommendations at no additional cost to the Owner.
   2. Decay Resistance: No decay when tested in accordance with ASTM E154/E154M.
   3. Water Vapor Permeance: 1 perm, maximum, when tested in accordance with ASTM E96/E96M.
   4. Heat Aging Resistance: No cracking, splitting, or pinholes when tested in accordance with ASTM C836/C836M.
   5. Products: Subject to compliance with these specifications, provide products of one of the following:
      a. Carlisle Coatings & Waterproofing, Inc; MiraSEAL: www.carlisleccw.com.
      b. Grace Construction Products; Procore: www.gcpat.com. (Basis of Design)
      c. W.R. Meadows, Inc; MEL-ROL LM: www.wrmeadows.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.03 ACCESSORIES

A. Surface Conditioner: bituthene type, compatible with membrane compound; as recommended by membrane manufacturer.

B. Protection Board: Rigid insulation furnished and installed by Section 07 21 00 - Thermal Insulation.

C. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.

1. Composition: Dimpled polyethylene core; polypropylene or polyester filter fabric adehered to surface of dimples.
2. Thickness: As indicated on drawings.
3. Products: Subject to compliance with these specifications, provide products of one of the following:
   a. Carlisle-CCW; Mira DRAIN 6200XL.
   b. Grace Construction Products; Hydroduct.
   c. W.R. Meadows, Inc; Mel-Drain 5035-B: www.wrmeadows.com.

D. Cant Strips: Premolded composition material as recommended by waterproofing manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.

C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.

D. Verify that items penetrating surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to waterproofing manufacturer.

3.03 INSTALLATION

A. Install waterproofing to specified minimum thickness in accordance with manufacturers instructions and NRCA (WM) applicable requirements.

B. Apply primer or surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

C. At joints and cracks up to 1 inch in width, including joints between horizontal and vertical surfaces, apply tape as recommended by manufacturer to seal joints and cracks in substrates.

D. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.

E. Seal membrane and flashings to adjoining surfaces.

3.04 INSTALLATION - DRAINAGE PANEL

A. Place drainage panel directly against all membrane surfaces, butt joints tightly, place to encourage drainage downward, and scribe and cut boards around projections, penetrations, and interruptions.

B. Schedule installation of protection board with Section 07 21 00 - Thermal Insulation contractor to occur immediately after placement of drainage panel and before back filling.

3.05 PROTECTION

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following thermal insulation work:
   1. Rigid Insulation applied to building foundation wall and under concrete slabs on grade.
   2. Board insulation and integral vapor retarder at cavity wall construction, perimeter foundation wall, underside of floor slabs, over roof deck, over roof sheathing, and interior wall with facer providing exposed finish.
   3. Batt insulation installed in exterior stud framed wall construction as part of the building thermal envelope and / or fire resistive rated construction.
   4. Batt insulation for installation in interior stud framed walls and above ceilings as part of an acoustic separation and or fire resistive rated construction.
   5. Mineral fiber insulation used as smoke sealing within stud spaces at slab edges, as part of curtain wall smoke sealing, or as part of firestopping installed by Section 07 84 00 - Firestopping.
   6. Rigid foam insulation in exterior walls where indicated on drawings.
   7. Flexible or Semi-Rigid mineral fiber board insulation in exterior walls where indicated on drawings.
   8. Insulation elsewhere not specifically indicated to be provided by other sections, including, but not limited to filling flutes at roof decks, and miscellaneous voids.
   9. Accessories for a complete installation.

B. Insulation products specified in this section to be furnished and installed by other sections include:
   1. Insulation board installed below slab-on-grade construction shall be provided and installed by Section 03 30 00 - Cast-in-Place Concrete.
   2. Rigid Insulation board and vented nailbase insulation within roofing assemblies shall be furnished and installed by the Roofing and Flashing Trade Contractor.
   3. Insulation board at exterior masonry cavity walls shall be furnished and installed by the masonry Trade Contractor.
   4. Insulation board in exterior wall cladding systems other than that assigned to the Masonry Trade Contractor shall be furnished and installed by the subcontractor responsible for the installation of the exterior wall cladding assembly.
   5. Mineral Fiber insulation used as part of a firestopping assembly or as firesafing at curtain wall gaps shall be furnished and installed by the Metal Windows Trade Contractor.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.
B. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov.
C. FM. Factory Mutual Research Corporation: www.fmglobal.com.
D. NFPA. National Fire Protection Association: www.nfpa.org.
E. UL. Underwriters Laboratories: www.ul.com.
F. ULE. Underwriters Laboratories Environment: www.ule.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards shall be as referenced by applicable codes, or most current edition if not referenced.
B. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board.

C. ASTM C240 - Standard Test Methods for Testing Cellular Glass Insulation Block.
D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
E. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
F. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
H. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
I. ASTM C1902 - Standard Specification for Cellular Glass Insulation Used in Building and Roof Applications.
J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
K. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
L. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C.
M. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
N. FM 4450 - Approval Standard for Class 1 Insulated Steel Deck Roofs.
O. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.
P. UL 1256 - Standard for Fire Test of Roof Deck Constructions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data: Provide data on product characteristics, performance criteria, and product limitations. Provide manufacturers' catalog data for each type and size of insulation to be used, with a schedule indicating product type by application.
    2. Samples: Provide two samples of each type of insulation proposed, approximately 6 by 6 inches in size.
    3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements and are approved for intended use with specified membrane materials.
    4. Installer qualifications.
C. Sustainability Submittals
    1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
    2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
        a. Include documentation of:
            1) Post-Consumer and Pre-Consumer recycled content.
            2) Environmental Product Declarations (EPD) and Health Product Declarations (HPD).
            3) CAL (CDPH SM) emissions testing compliance for IEQ: Low Emitting Materials insulation category, for products used within the weatherproof building envelope.

D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.
   2. Operation and Maintenance Data: Basic Owner requirements to maintain warranty.
   3. Warranty Documentation: Submit manufacturers' warranties and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience, and approved by manufacturer.
B. Single Source Responsibility: Furnish each type of thermal insulation system material from one manufacturer for entire project, unless otherwise acceptable to Architect.
C. Refer to Section 01 91 19 - Building Envelope Commissioning for requirements associated with building envelope commissioning applicable to this section. This subcontractor shall cooperate fully with the Building Envelope Commissioning Agent to provide access for testing of installed materials and to repair or remediate conditions identified by the Building Envelope Commissioning Agent in order to obtain his acceptance of installed work.

1.06 REGULATORY REQUIREMENTS

A. Above-grade exterior wall assemblies using rigid foam board insulation must utilize products that have been tested and approved as part of a wall assembly meeting NFPA 285. Products specified herein are part of a system that includes vapor retarder / air infiltration barrier membrane products, and any contractor substitution must be coordinated with the following sections, to assure that the proposed product is part of a tested assembly that includes products of those sections.
   1. Section 04 20 00 - Unit Masonry.
   2. Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers.

1.07 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.
   1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.08 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
   1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   3. Thermal Resistance, R-value: 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
   4. Compressive Resistance: 25 psi; at vertical applications, 60 psi at horizontal applications under slabs and footings. Refer to structural drawings for compressive resistance in other locations.
   5. Board Size: to be coordinated with masonry veneer anchor and wall system sub-girt spacing. For other applications provide largest boards practical.

a. At masonry cavity walls: Basis of design: 16 inches by longest practical length. Coordinate board width with veneer anchor spacing.
b. At metal wall panel or other exterior finish with sub-framing penetrating insulation: provide longest practical length - coordinate board width with metal wall panel support framing spacing.
c. At concrete slabs and foundation walls with no veneer anchors or other penetrants: largest practical board size.

6. Materials shall meet the requirements of NFPA 285 testing as part of an approved wall assembly in the thickness indicated.
7. Board thickness: As indicated on drawings.
8. Board Edges:
   a. Tongue-and-groove at foundation walls and horizontal applications with no veneer anchors or other penetrants that would prevent tight fit of boards.
   b. Square at masonry cavity walls or other siding where veneer anchors or other supports prevent tight fit of tongue and groove application.
9. Water Absorption: 0.7 percent by volume, maximum, by total immersion.
10. Global Warming Potential: provide products from manufacturer's reduced global warming potential (GWP) product lines.
11. Fire Retardants: provide products that do not use halogenated fire retardants ("NH").
12. Products: Subject to compliance with these specifications, provide products of one of the following:
    a. DuPont de Nemours, Inc; Grey Styrofoam: building.dupont.com.
    b. Owens Corning Corporation; FOAMULAR NGX: www.ocbuildingspec.com.
    c. Soprema Group; SOPRA-XPS; www.soprema.com.

B. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
1. Classifications:
   a. Type I: Faced with aluminum foil on both major surfaces of the core foam.
      1) Class 1 - Non-reinforced core foam.
      2) Compressive Strength: 20 psi, minimum.
      3) Thermal Resistance, R-value: At 3 inch thick; 19.0 at 3 inches, minimum, at 75 degrees F.
2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Water Vapor Permeance: 0.05 perm, maximum, at 1 inch thickness, and when tested in accordance with ASTM E96/E96M, desiccant method.
5. Water Absorption: less than 0.5 percent by volume when tested in accordance with ASTM C209 .
6. Comply with fire resistance requirements indicated on drawings as part of an approved wall assembly when tested in accordance with NFPA 285.
7. Fire Retardants: Provide products that do not use halogenated fire retardants ("NH").
8. Board Size: 48 inch by 96 inch.
9. Board Thickness: 3.0 inch.
10. Board Edges: Square.
11. Products: Subject to compliance with these specifications, provide products of one of the following:
    a. Atlas Roofing Corporation; EnergyShield Pro Continuous Wall Insulation; www.atlasrwi.com: www.atlasrwi.com.

b. DuPont de Nemours, Inc; Thermax Brand (ci) Exterior Insulation: www.dupont.com.
c. Hunter Panels; Xci Foil (Class A): www.hunterpanels.com.
d. Johns Manville; AP Foil-Faced: www.jm.com.
e. Ox Engineered Products; ISO Red Max (Polyiso Class A): www.oxengineeredproducts.com.
f. Sika Rmax Inc; ECOMAXci FR: www.usa.sika.com.
g. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Polyisocyanurate Insulation for use in roofing system.
1. Thermal Resistance, R-value: 23.5 minimum at 4 inch thickness.
2. Flame Spread Index (FSI): Class B - 26 to 75, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Polyisocyanurate insulation for use in single ply roof membrane system shall meet requirements of UL 1256 or FM 4450.
5. Insulation shall be a material approved by the manufacturer for use in warranted roofing system.
6. Insulation shall be approved in writing by insulation manufacturer for intended use with specified membrane materials.
7. Insulation shall not utilize halogenated flame retardants.
8. Board Size: 48 inch by 96 inch where indicated to be mechanically attached, and 48 inch by 48 inch where indicated to be adhered.
9. Board Edges: Square.
10. Tapered Insulation: Provide tapered insulation and crickets as indicated on drawings (1/4 inch in 12 inches min.)
11. Products - Low Slope Roofing: Insulation products as manufactured by or certified by roofing system manufacturer to be included under the roofing system warranty.

D. Cellular Glass Insulation: Complying with ASTM C1902, Type IV, Grade 6 with the following characteristics:
1. Smoke Developed Index: 0, when tested in accordance with ASTM E84.
2. Board Size: 3.63 by 17.717 inches, nominal.
3. Board Thickness: 2 inches, nominal, with flat surface.
4. Board Edges: Square.
5. Compressive Strength: 398 psi, minimum.
6. Products: Subject to compliance with these specifications, provide products of one of the following:
a. Owens Corning Corporation; FOAMGLAS Perinsul SIB: www.ocbuildingspec.com/, or equal.
b. Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.

2.02 MINERAL FIBER BOARD INSULATION MATERIALS

A. Mineral Wool Block, Board, or Blanket Thermal Insulation: Complying with ASTM C612 or ASTM C553.
1. Where indicated, provide fiberglass reinforced polypropylene facing on one side; with flame spread index of 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.

3. Board Thickness: As indicated on drawings or to meet UL assembly requirements.
4. Medium Density: Minimum 4.3 pounds per cubic foot. For use in rainscreen conditions incorporating thermally broken rainscreen attachment system.
    a. Thermal Resistance: Minimum R-value of 4.3 per inch.
    b. Products: Subject to compliance with these specifications, provide products of one of the following:
        1) Johns Manville; JM CladStone 45: www.jm.com.
        2) Owens Corning; Thermafiber Rainbarrier 45: www.owenscorning.com.
        3) Rockwool; CAVITYROCK: www.rockwool.com.
        4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

A. Type and location. Where batt insulation is indicated interior to the building weather resistive barrier or VRAIB, provide glass fiber batts unless indicated otherwise.

B. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
    1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
    2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
    3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
    4. Formaldehyde Content: Zero.
    5. Thermal Resistance: R-value of R15 at 3-1/2 inches. R21 at 6 inches when used in exterior wall framing between studs
    6. Facing: Unfaced.
    7. Products: Subject to compliance with these specifications, provide products of one of the following:
        a. Johns Manville; Formaldehyde-Free Fiberglass Insulation: www.jm.com.
        b. Knauf; EcoBatt: www.knaufnorthamerica.com.
        c. Owens Corning Corporation; EcoTouch Pink NexGen: www.ocbuildingspec.com.
        d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Mineral Wool Blanket Thermal Insulation: Flexible or Semi-Rigid formaldehyde-free preformed batt or blanket insulation, complying with ASTM C665; friction fit; unfaced.
    1. Flame Spread Index: 0 (zero), when tested in accordance with ASTM E84.
    2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
    3. Thermal Resistance: R-value of R15 at 3-1/2 inches; R24 at 6 inches, when used in exterior wall framing between studs.
    4. Density:
        a. 1 inch thick: 4 pounds per cubic foot nominal, or per requirements of approved fire-rated wall assembly.
        b. Greater than 1 inch thick: 2 pounds per cubic foot nominal, or per requirements of approved fire-rated wall assembly.
    5. Corrosivity: Non-corrosive, when tested in accordance with ASTM C665.

6. Product shall be ULE-certified formaldehyde-free, or meet ultra-low emitting formaldehyde (ULEF) no added formaldehyde (NAF) standards.
7. Products:
   a. Johns Manville: www.jm.com.
      1) Exterior Wall Framing between studs: Mineral Wool TempControl.
      2) Interior partitions: Mineral Wool SAFB.
   b. Owens Corning: www.ocbuildingspec.com.
      1) Exterior Wall Framing between studs: Thermafiber Fire & Sound Guard Plus.
      2) Interior partitions: Thermafiber SAFB.
   c. ROCKWOOL: www.rockwool.com.
      1) Exterior Wall Framing between studs: Comfortbatt.
      2) Interior partitions: Safe'n'Sound.
   d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.04 ACCESSORIES

A. Vapor Retarder/ Air Infiltration Barrier (VR/AIB): Specified in Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers, to be provided by Section 07 00 01 - Waterproofing, Dampproofing, and Caulking Trade Bid Summary Trade Contractor .

B. Vapor Retarder for installation below slab on grade construction: Specified in Section 03 30 00 - Cast-in-Place Concrete, to be provided by that Contractor.

C. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.

D. Insulation Fasteners: Impaling clip of unfinished steel for interior applications; galvanized steel for exterior applications with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

E. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.

F. Adhesive: Type recommended by insulation manufacturer for application and substrate materials and complying with applicable fire resistance requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Comply with manufacturer's written installation instructions for preparing substrates.

B. Coordinate schedule of installation with Owner to ensure building is not occupied during installation. Identify and block all fresh-air ventilation intakes into the building with plastic sheets to prevent fumes from entering the building.

3.02 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.03 INSTALLATION - GENERAL

A. Insulation shall be installed by Trade Contractors as described in PART 1 of this specification and their respective Trade Bid Summaries. Insulation not assigned to Trade Contractors shall be the responsibility of the Construction Manager.

B. Install insulation in accordance with manufacturer’s written application instructions, as per the drawings and specifications.

C. Install insulation as a contiguous envelope on all sides, including roofs, exterior walls and at grade; make airtight around each fenestration.
   1. Secure insulation in place to prevent shifting and discontinuity of the insulation envelope.
   2. Allow for material and building movement.
   3. Insulation thickness to uniformly achieve R-Value performance for each surface plane as called out by the drawings and specifications, or where not called out, as specified.

D. Install rigid insulating units with joints close and flush, in regular courses and with cross-joints overlapping.
   1. Align and space rigid insulation joints with building movement joints.
   2. Seal perimeter and around penetrations with compatible materials as recommended by manufacturer.

E. Do not close-up wall cavities, pipe or other chases or conceal other work requiring inspection until inspections by Authority Having Jurisdiction have been successfully completed.

3.04 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install insulation in accordance with manufacturer’s written application instructions, as per the drawings and specifications.

B. Apply adhesive to back of boards:
   1. Apply adhesive per manufacturer's installation instructions, but not in horizontally oriented beads.

C. Install boards horizontally on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

E. Butter all edges of insulation boards with adhesive bed or seal all joints between boards with sealant recommended by manufacturer. Make insulation continuous, filling all voids with insulation or sealant.

3.05 RIGID BOARD INSTALLATION AT EXTERIOR WALLS

A. Install insulation in accordance with manufacturer’s written application instructions, as per drawings and specification.

B. Butter all edges of insulation boards with adhesive bed or seal all joints between boards with sealant recommended by manufacturer. Make insulation continuous, filling all voids with insulation or sealant.

C. Install boards horizontally on walls.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and protrusions.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane. Apply sealant at all penetrations.

E. Comply with manufacturer's recommendations for applicable insulation type regarding method and products for taping or otherwise addressing board joints.

F. Seal all penetrations or damage of polyisocyanurate foil-facing, including at fasteners and masonry veneer anchors in accordance with manufacturer's written installation instructions.

3.06 MINERAL FIBER INSULATION

A. Install insulation in accordance with manufacturer's instructions, as per the Drawings and Specification.

B. Fill flutes at underside of metal decking as indicated on drawings with shapes factory-cut to profile to completely fill voids. Friction fit insulation into place or use mechanical fasteners if configuration will not permit insulation to remain in place.
C. Fill annular space at ductwork, pipe, and other wall penetrations in non-rated partitions where not exposed to view with insulation to full thickness of wall stud. Coordinate installation with mechanical ductwork installer to place materials before duct sleeve / covers are installed at the penetrations.
D. Install insulation at firestopping assemblies in accordance with the requirements of Section 07 84 00 - Firestopping, and the UL requirements for the chosen assemblies.
E. Install insulation at slab edge smoke sealing tightly fit between adjacent materials, leaving no voids or gaps that would allow the passage of smoke.
F. Installation shall meet AHJ requirements and approval.
G. Coordinate with the Section 05 40 00 - Cold-Formed Metal Framing contractor to ensure that support is provided for insulation as shown on drawings.

3.07 GLASS FIBER BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.
B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
D. Fit insulation tightly in cavities with sufficient friction to hold material in place until wall board is installed.
E. Fill stud cavities at partitions from floor to not less than 6 inches above the highest adjacent ceiling finish.
F. Where installed in exterior framed walls and batt insulation does not fill stud cavity depth, install insulation against the interior surface of the exterior sheathing, leaving a gap between insulation and interior wall finish.
G. Where indicated on drawings, install batt insulation on ceilings tightly fit to minimize gaps between sections. Do not lay insulation over or within 3 inches of recessed lighting fixtures.
H. Coordinate with Section 05 40 00 - Cold-Formed Metal Framing.
I. Coordinate work of this section with construction of VR/AIB seal specified in Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers.
J. Coordinate with Section 09 21 16 - Gypsum Board Assemblies.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Remove, repair and reinstall, or restore in place damaged items.
    1. Replace damaged materials or items with new if repair not acceptable to Architect.

3.09 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.10 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, or other causes.
    1. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
B. Protect polyisocyanurate board core (insulating foam material) from water infiltration and wetting. Repair damaged foil facing as soon as possible after occurrence or indication of damage.

END OF SECTION

SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following foamed-in-place insulation work:
   1. Spray-applied polyurethane foam (SPF) Insulation: for use as floor insulation.
   2. Spray-applied polyurethane foam (SPF) insulation, vapor retarder / air barrier:
      a. As building insulation, in locations indicated on drawings.
      b. In miscellaneous joints in exterior walls, as indicated on drawings.
      c. At junctions of dissimilar wall and roof materials, as indicated on drawings.
      d. At small or inaccessible voids in the building thermal envelope where the installation of other types of insulation is not practical.
      e. Other locations indicated on drawings.
   3. Foam Acoustic Insulation: At penetrations of interior walls to fill annular spaces as acoustic insulation.
   4. Cementitious overcoat.
   5. Accessories for a complete installation, including but not limited to miscellaneous air sealing materials and primer.

B. Insulation products specified in this section to be furnished and installed by other sections include:
   1. Foamed-in-place insulation at junctions and joints at changes in plane and edges of cavity wall insulation, to be furnished and installed by the Masonry Trade Contractor.
   2. Foamed-in-place insulation at junctions and joints at changes in plane and edges of roof insulation, to be furnished and installed by the Roofing and Flashing Trade Contractor.
   3. Foamed-in-place insulation at gaps between frames or subframes and wall construction, to be furnished and installed by the Metal Windows Trade Contractor.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.

B. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

D. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

E. ASTM D1622/D1622M - Standard Test Method for Apparent Density of Rigid Cellular Plastics.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

G. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C.

H. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

I. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

J. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

K. OTC Model Rule, AIM - Architectural, Industrial, and Maintenance Coatings.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
   1. See Section 01 70 00 - Execution and Closeout Requirements.

B. Coordination per Section and as follows:
   1. See Section 01 31 14 - Coordination.
   2. Coordinate with steel fabricator to assure steel preparation is in accordance with spray-applied foam insulation requirements for bonding.

C. Sequencing and Scheduling:
   1. Coordinate installation of acoustic foam sealant with other trades so that work of this section is complete for annular openings around penetrations prior to installation of escutcheons, frames, angle covers, or other devices that will conceal openings.
   2. Sequence work of this section with work of Section 04 00 01 - Masonry Trade Bid Summary and Section 04 20 00 - Unit Masonry.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.
   2. Certificates: Certify that products of this section meet or exceed specified requirements and meet regulatory requirements of state and local building codes for the intended applications.
   3. Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and pre-consumer recycled content.
         2) Environmental Product Declarations (EPD).
         3) Health Product Declarations (HPD).
         4) CAL (CDPH SM) emissions testing compliance for IEQ: Low Emitting Materials insulation category, for products used within the weatherproof building envelope.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience, and approved by manufacturer.

B. Single Source Responsibility: Furnish foamed-in-place insulation system materials from one manufacturer for entire project, unless otherwise acceptable to Architect.
C. VOC Requirements: Product shall meet LEED requirements for targeted credits, and OTC Model Rule, AIM .
D. Refer to Section 01 91 19 - Building Envelope Commissioning for requirements associated with building envelope commissioning applicable to this section. This subcontractor shall cooperate fully with the Building Envelope Commissioning Agent to provide access for testing of installed materials and to repair or remediate conditions identified by the Building Envelope Commissioning Agent in order to obtain his acceptance of installed work.

1.07 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.
   1. See Section 01 40 00 - Quality Requirements for additional requirements.

1.08 DELIVERY, STORAGE AND HANDLING

A. See Section 01 60 00 - Product Requirements.
B. Comply with manufacturer's instruction and recommendations, and as follows:
   1. Delivery and Acceptance Requirements: Deliver materials to project site in an undamaged condition, with original protection, bearing intact labels.
      a. Fire Hazard: Do not deliver plastic insulation materials to the project site ahead of the time of installation. Protect at all times against ignition. Complete the installation and concealment of plastic as rapidly as possible in each area of work.
   2. Storage and Handling Requirements: Protect materials and accessories during shipping, handling, storage and installation from exposure to weather, water, direct sun, soiling, deterioration, and other damage.
      a. Store insulation under opaque covering; protect from weather and extended exposure to direct sunlight.
      b. Thermal protection of liquid raw materials: protect from freezing or extreme heat. Maintain chemical components at a minimum of 60 degrees F while stored on site.

1.09 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by manufacturer for ambient air and substrate.
B. Do not apply foam when wind speed exceeds maximum specified by manufacturer.
C. Do not apply foam when temperature is within 5 degrees F of dew point.
D. Protection of premises from damage: Protect at all times against ignition of insulation materials.
E. Comply with fire ratings indicated for each wall system and necessitated by code for insulation materials.
F. Health and safety: There may be odors and vapors related to field-applied urethane foams and sealants. While there is minimal danger from exposure to vapors of this product during installation with normal venting, individuals with respiratory sensitivities should evacuate the premises while the work is being done.
   1. Protect areas where ventilation is adequate with signage, and require personnel in unvented areas to wear proper breathing protection.
   2. Protect fresh air inlets and seal off, air-tight, any areas where air may transfer from work area to occupied areas. Coordinate with Owner to develop an implementation plan.

PART 2 PRODUCTS

2.01 MATERIALS

A. Spray-Applied Polyurethane Foam (SPF) Insulation: for use at locations as indicated on drawings:
   1. R-value (aged) per ASTM C518: Not less than R 6.5 per inch.
   2. Closed cell content: Greater than 90 percent.
   3. Air permeance, as tested per ASTM E2178: Not greater than 0.004 cfm per square foot (0.02 L/s x square meter) under a pressure differential of 0.3 inch water gauge (75 Pa).
   4. Compressive strength: Minimum 16 psi, when tested per ASTM D1621.
   5. Density: Minimum 2 pcf, when tested per ASTM D1622/D1622M.
   6. Surface Burning Characteristics: Flame spread/smoke developed index of 25/400 when tested per ASTM E84.
   7. Products: Subject to compliance with these specifications, provide products of one of the following:
      a. BASF Polyurethane Foam Enterprises; Walltite; www.basf.us.
      b. Carlisle; SealTite Pro HFO: www.carlislesfi.com.
      c. Demilec Inc.; Heatlok Soy 200 Plus; www.demilec.com. (Basis of Design)
      d. NCFI Polyurethanes; InsulBloc; www.ncfi.com.
      e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, closed cell polyurethane foam, for use as crack filler; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
   2. Air Permeance: Less than 0.0001 liters per second per square meter, when tested per ASTM E283/E283M.
   3. Compressive Strength: Minimum 25 psi, when tested in accordance with ASTM D1621.
   4. Density: Minimum 2 pcf, when tested in accordance with ASTM D1622/D1622M.
   5. Closed Cell Content: Greater than 90 percent.
   6. Products: Subject to compliance with these specifications, provide products of one of the following:
      a. BASF Corporation; WALLTITE US: www.spf.basf.com.
      b. Johns Manville; JM Corbond III Closed Cell Spray Polyurethane Foam: www.jm.com.
      c. NCFI; Insubloc: www.ncfi.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Foam Acoustic Insulation: Where foam insulation or spray applied acoustic Insulation is indicated at tops of non-rated interior walls or at penetrations of non-fire-rated interior walls, insulation shall be as follows:
   1. Noise Reduction Coefficient: 1.00 per ASTM C423.
   2. Smoke Developed: less than 25 per ASTM E84.
   3. Flame Spread: less than 450 per ASTM E84.
   4. Noncombustible per ASTM E136.

5. Specified insulation shall be composed of white, inorganic non-combustible glass fibers (25 percent recycled glass) and a non-hazardous, water-based synthetic emulsion adhesive, acceptable by building code for use in exposed application without intumescent top-coatings.
6. Provide mineral board backing for sealant in large gaps.
    a. See Section 07 21 00 - Thermal Insulation.
7. Products: Subject to compliance with these specifications, provide products of one of the following:
    a. International Cellulose Corp: K-13 Thermal Insulation Spray System: www.spray-on.com.
    b. Monglass; Sonoglass Spray Acoustic Insulation; www.monoglass.com.
    c. ThermaCoustic Industries International Limited: TC-417 GP: www.thermacoustic.com. (Basis of Design)
    d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 ACCESSORIES

A. Miscellaneous Air Sealing Materials: Provide caulking with approved caulking compound at all locations requiring air infiltration sealing that are too small (3/16 inch or less) for foam sealants.

B. Primer: As recommended by insulation manufacturer and compatible with substrate.

C. Overcoat: Cementitious type, spray applied; flame spread index of 25 maximum and smoke developed index of 100 maximum, when tested in accordance with ASTM E84.
    1. Products: Subject to compliance with these specifications, provide products of one of the following:
        a. Flame Control Coatings, LLC; Foam Kote 50-50A: www.flamecontrolcoatings.com.
        b. FlameSeal LLC; FlameSeal-TB: www.flameseal.com. (Basis of Design)
        c. ICP Building Solutions; Fire Shell F10E: www.fireshellcoatings.com.
        d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions:
    1. See Section 01 40 00 - Quality Requirements.
    2. Carefully examine installation areas with installer/applicator present, for compliance with requirements affecting work performance.
    3. Verify work within construction spaces or crevices is complete before insulation application.
    4. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

A. Comply with manufacturers written installation instructions for preparing substrates.

B. Remove dust, dirt, oil, grease, oxidation, loose paint, surface particles, and other foreign matter from surfaces to which the insulation is to be applied that would interfere with proper bond to substrates. Substrate shall be dry and free of all frost or other elements that may affect adhesion of the system, including high moisture content.
    1. If loose particles are present, review acceptable methods of removal with the foamed-in-place insulation manufacturer.

C. Coordinate schedule of installation with Owner to ensure building is not occupied during installation. Identify and block all fresh-air ventilation intakes into the building with plastic sheets to prevent fumes from entering the building.
D. Verify all transition and flashing membranes are installed prior to foamed-in-place insulation application.
E. Mask and protect adjacent surfaces from overspray or dusting.
F. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions and recommendations.
B. Spray-Applied Polyurethane Foam Insulation (SPF): Install to specified thickness or a minimum R-19 value at structural steel, insulation infill at roof / wall transitions, and other exterior sheathing penetrations to form a completely sealed thermal envelope.
    1. Process a two-component urethane foam system with 1:1 ratio by volume, positive-displacement, industry-standard pumping equipment.
    2. Monitor and maintain the component ratio and mix the components of the urethane chemicals in accordance with the manufacturer's product specifications and processing instructions to achieve the desired density and physical properties. Verify the product component ratio with flow meters and programmable ratio monitoring equipment that can prevent the installation of product that is off ratio by more than the manufacturer’s prescribed limits.
    3. Monitor and maintain the component temperatures in accordance with the manufacturer's product specifications and processing instructions to achieve the desired density and physical properties.
    4. Ambient and substrate temperature conditions shall be in accordance with the manufacturer’s minimum requirements during and for the minimum duration of the recommended curing period after the installation.
        a. Coordinate with Masonry Trade Contractor and Construction Manager for use of heated enclosures.
    5. Apply insulation by spray method, to a uniform monolithic density without voids.
    6. Apply to a minimum cured thickness of 3 inches.
C. Foam Acoustic Insulation:
    1. Apply insulation at the head joint condition and each penetration of non-fire-rated interior partitions.
    2. Board tamp and remove overspray insulation where it will be exposed to view in the finished construction, leaving it suitable to receive finish paint systems by Section 09 91 23 - Interior Painting.
    3. Coordinate installation of acoustic foam sealant with other trades, to ensure that insulation is installed in annular spaces prior to concealment of openings upon installation of flanges, sleeve covers, or other devices.
    4. Ensure that all clips, hangers, sleeves, or other items that will penetrate the insulation are in place prior to insulation application.
    5. Fill annular spaces and voids continuously and completely, leaving no gaps or voids.
    6. If joint widths will not allow insulation to span joint without reinforcement, provide compatible closed cell foam backer rod to provide back-up material for foam insulation.
    7. Apply insulation in one-pass application in sufficient thickness to provide the NRC rating indicated, or if NRC is not indicated, apply insulation to thickness to provide NRC rating not less than that of the general wall construction.

8. For sealant in large gaps, provide mineral board backing as specified in Section 07 21 00 - Thermal Insulation.

D. Apply overcoat monolithically, without voids, to fully cover foam insulation, to achieve fire rating required.

E. Patch damaged areas.

F. Where applied to voids and gaps ensure space for expansion to avoid pressure on adjacent materials that may bind operable parts.

G. Trim excess away for applied trim or remove to ensure continuous sealant bead.

3.04 FIELD QUALITY CONTROL

A. Inspection will include verification of insulation and overcoat thickness and density.

B. Remove, repair and reinstall, or restore-in-place damaged materials or items.

1. Replace damaged materials or items with new if repair not acceptable to Architect.

3.05 CLEANING AND PROTECTION

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean up overspray from surfaces not intended to be covered immediately.

C. Dispose of surplus and waste materials in accordance with regulations.

D. Provide a minimum of 48 hours of ventilation of affected interior areas prior to allowing occupants into affected areas.

3.06 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 22 00
FLUID-APPLIED THERMAL BREAKS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following fluid-applied thermal break acrylic work for application to steel structures and supports in accordance with all applicable requirements of contract documents, for locations and members requiring fluid-applied thermal break acrylic.
   1. Corrosion protection primer material.
   2. Fluid-applied acrylic thermal break.
   3. Topcoat for fluid-applied thermal break acrylic.

1.02 ABBREVIATIONS AND ACRONYMS

A. AISC. American Institute of Steel Construction: www.aisc.org.
B. ASTM. ASTM International: www.astm.org.
C. SSPC. Society for Protective Coatings: https://sspc.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
B. AISC (MAN) - Steel Construction Manual.
C. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
E. ASTM D870 - Standard Practice for Testing Water Resistance of Coatings Using Water Immersion.
F. ASTM D1653 - Standard Test Methods for Water Vapor Transmission of Organic Coating Films.
G. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
H. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
I. ASTM D4585 - Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
J. ASTM D5894 - Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet).
K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
L. ASTM G8 - Standard Test Methods for Cathodic Disbonding of Pipeline Coatings.
M. SSPC-SP 6 - Commercial Blast Cleaning.

1.04 SUBMITTALS

A. Refer to Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Submit product data including manufacturers technical data indicating product performance characteristics, performance, and limitation criteria.
   2. Design Data: Submit published design listings for insulation value ratings and product thickness. Include evidence of manufacturer's testing of fluid-applied thermal break product and that the material tested was produced at the manufacturers facility under the supervision of technical personnel.

3. Installer's Qualification Statement: Submit applicators current certification as a manufacturer trained applicator.
4. Manufacturer's written recommendations for application thickness of fluid-applied thermal barrier at each type of special shape on project, and for each location where spacing is less than will allow for manufacturer's recommended extensions from wall at building interior and exterior.
5. Testing Reports: dry film thickness (DFT) of the applied material.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements, and Section 01 78 00 - Closeout Submittals.
2. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in applying the work of this section with documented experience and trained by the manufacturer..

B. Fluid-applied thermal break acrylic system shall be the complete system from a sole source consisting of primer, acrylic thermal break material and topcoat.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements, for additional requirements.
1. Delivery: Deliver materials in manufacturers' original, sealed, undamaged container with identification label intact. Packaged materials shall bear the appropriate labels, seals.
2. Storage: Materials shall be stored in strict accordance with manufacturers documented instructions.
3. Documentation: All batch number, product identification and quantities shall be recorded on appropriate QC documents. A copy of the transport document and manufacturers conformance certificate shall be attached to the material delivery on site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to meeting the requirements of this specification, acceptable manufacturers include:
1. PPG; Hi-Temp 707 HB: www.ppgpmc.com.
2. Sherwin Williams; Heat-Flex 3500 Thermal Insulative Coating: industrial.sherwin-williams.com.
3. Tnemec Company; Aerolon Series 971: tnemec.com.
4. Other manufacturer's products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: Refer to Section 01 60 00 - Product Requirements.

2.02 SYSTEM DESCRIPTION

A. Performance Requirements:
   1. The fluid-applied hermal break acrylic based material shall be applied at the required thickness to provide the required R - Value of R- 4:
      a. W beams: 1 inch thickness.
      b. Tube steel: 1 inch thickness.
      c. Special shapes: contractor to obtain manufacturer's written recommended thickness for each special shape.
      d. Fluid-applied thermal break shall be applied to steel members, extending to manufacturers' recommended distances from the exterior of the building facade and continuously back the width of wall section, and extended to manufacturer's recommended distance to the warm side of the wall section to the interior of the building to the inside face of the wall cavity. If spacing has less than manufacturer's recommended distance overall, contractor shall obtain manufacturer's written recommendation on thickness for each condition.
      e. ASTM E84: Class A.
      f. ASTM D5894: 4000 hours Prohesion.
      g. ASTM B117: 4000 hours Salt Fog.
      h. ASTM D870: 4000 hours. Immersion.
      i. ASTM D4585: 4000 hours. Humidity.
      j. ASTM D870, Method B: 2,000 hours. 140 degree F D.I. Water Immersion.
      k. ASTM D4060: (CD-17 Wheel, 1000g load): No more than 50 mg loss after 1000 cycles.

B. All patching and repair to material, due to damage by other trades, shall be performed under this Section and paid for by the trade responsible for the damage. Patching shall be performed by applicators, certified by the manufacturer, and applied in accordance with the manufacturer application instructions.

C. Primer:
   1. Basis of Design product: Tnemec Series 90-97, 394 or 1224 manufactured by Tnemec Company.
   2. Bond strength: ASTM D4541 1320 psi.
   3. Abrasion Resistance: ASTM D4060 181 mg.
   4. Cathodic Disbondment: ASTM G8 No disbondment 3000 Hrs.
   5. Water Vapor Transmission: ASTM D1653 .68 g/m2 /24hrs / less than 0.22 prms.

D. Fluid-applied thermal break:
   1. Basis of Design product: Tnemec Series 971 Aerolon Fluid-Applied Thermal Break.
   2. Solids by Volume 76 percent water based thermal acrylic spray applied.
   3. Recommended Film thickness 40-300 mils applied in multiple applications to specified R Value.
   4. VOC Content 0.01 lbs./Gallon.
   5. Thinned .01 lbs./ gallon.
   6. HAPS- 0 lbs. per gallon solids.
      a. ASTM D4060 (CD-17 Wheel, 1000g load): No more than 50 mg loss after 1000 cycles.
   7. Curing time at 75 degrees F, 4 hours to touch, 16 hours to recoat.
   8. Must meet ASTM C518: No more than 50 mW/ mK.
   9. Primer required: as recommended by fluid-applied thermal break manufacturer.
   10. Topcoat required: as recommended by fluid-applied thermal break manufacturer, for project conditions.

PART 3 EXECUTION

3.01 EXAMINATION

A. All surfaces to receive fluid-applied thermal barrier shall be prepared per manufacturers written instructions and be clean, dry, and free of oil, grease, loose mill scale, dirt, dust, or other foreign substances which would impair bond of the material to the substrate.

B. Corrections of surfaces to receive the fluid-applied Thermal Break material shall be the responsibility of the Contractor at no additional cost to the Owner.

C. Application of the primer, fluid-applied thermal barrier, and topcoat shall not commence until the contractor, applicator and inspector have examined the surfaces to receive the primer and determined the surfaces are acceptable to receive the primer and fluid-applied thermal barrier. Commencement of application means acceptance of substrate.

D. Verify that substrate and workspace temperature and humidity conditions are in accordance with manufacturers recommendations.

3.02 PREPARATION

A. Protect work area from windblown dust and rain. Protect adjacent areas from over spray of material.

B. Provide masking, drop cloths or other suitable coverings to prevent overspray onto surfaces not intended to be coated with thermal break coating.

C. Clean substrate (Steel or Concrete) free from dust, dirt, grease, paint, or other foreign substances that would impair with the bond of the primer and fluid-applied thermal break product.

D. Abrasive blast-clean the steel substrate in accordance with SSPC-SP 6 in the shop. Prime with fluid-applied thermal break manufacturer's recommended primer for substrate, at manufacturer's recommended thickness. Surface For concrete surfaces where thermal break is needed grind all surfaces to receive primer.

E. Weld spatter and defect shall be ground smooth prior to commencement of primer and fluid-applied thermal break material.

F. Primer shall not be applied to prepared substrate until the area has been adequately vented to remove all airborne dust. Prior to the application of any coating material, the blast products, dust and debris, shall be removed by vacuuming.

3.03 INSTALLATION

A. Equipment and application procedures shall conform to the manufacturer’s application instructions. The fluid-applied thermal break material shall be applied at the required dry film thickness (DFT) per the appropriate R- value specified.

B. Provide ventilation in areas to receive work of this section during application and minimum 24 hours after application.

C. Temperature and Humidity Requirements: Maintain air temperature and relative humidity in areas where products will be applied, for a time period before, during, and after application, as recommended by manufacturer.

1. Do not apply fluid-applied thermal break when temperature of substrate and/or surrounding ambient air temperature is below manufacturer's recommended limits. Temporary protection and heat shall be maintained at this minimum temperature for 24 hours before, during and 24 hours after material application.
2. Steel substrate temperature shall manufacturer's recommended limit for degrees above the dew point of the surrounding air for a period of 24 hours prior, during the application of the material and 24-hour cure period.
3. If necessary for job schedule, Construction Manager shall provide enclosures and heat to maintain proper temperatures and humidity levels in the application areas.

4. The relative humidity of the application area shall not exceed manufacturer's recommended limit for 24 hours prior, during, and 24 hours after the application of the material. The relative humidity shall not exceed manufacturer's recommended limit throughout the application and curing of the decorative top coat finish.

D. Field erection/handling of coated steel member shall be in accordance with AISC (MAN) for handling and erecting a finished product. Offset steel coated with fluid applied thermal barrier on dunnage to minimize damage.

3.04 FIELD QUALITY CONTROL

A. The Owner will pay for an independent testing laboratory to inspect and verify the application of material in accordance with the provisions of the fluid-applied thermal break manufacturer.

B. The fluid-applied thermal break material inspection and testing shall be performed 24 hours after completion of final application coat.

C. The results of the above tests shall be made available to all parties at the completion of each pre-designated area and approval.

D. In-place material not in compliance with desired R Values the specification requirements shall be corrected prior to final approval.

E. The dry film thickness (DFT) of the applied material shall be measured with a nondestructive coating thickness gage after material has completely cured. All measurements shall be documented in writing and submitted to Architect.

3.05 CLEANING

A. Refer to Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Upon completion of installation, all excess material, overspray, and debris shall be cleared and removed from the job site.

3.06 PROTECTION

A. Protect installed fluid-applied thermal break work from subsequent construction operations.

END OF SECTION

SECTION 07 27 00
VAPOR RETARDER / AIR INFILTRATION BARRIERS

PART 1 GENERAL

1.01 TRADE BID CONTRACT REQUIRED

A. The work of this Section shall be included in the Waterproofing, Dampproofing, and Caulking (WD&C) Trade Contract. See Section 07 00 01 - Waterproofing, Dampproofing, and Caulking Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and erecting the following weather barrier work:
   1. Vapor Retarders/ Air Infiltration Barrier (VR/AIB): Materials to make exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls water vapor resistant and airtight.
   2. Accessories for a complete installation, including but not limited to sealants, tape, flexible flashings, thinners, and cleaners.

1.03 DEFINITIONS

A. VR/AIB (Vapor Retarder/ Air Infiltration Barrier): Airtight barrier made of material that is relatively water vapor impermeable, to degree specified, with seams and joints sealed to adjacent air barrier system components.

B. Air Barrier System: The complete and continuous system of components, properly connected, to make an airtight barrier around the building.

C. Air Barrier System Component: Components of the Air barrier system are the VR/AIB, windows, doors, skylights, curtain walls, louvers and approved flashings and tapes.

D. Water Vapor Permeance: For purposes of conversion, 57.2 ng/(Pa s sq m) equals 1 perm.

1.04 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org. https://www.aatcc.org.

B. MSBC. Massachusetts State Building Code: www.mass.gov/massachusetts-state-building-code-780-cmr.

C. NFPA. National Fire Protection Association: www.nfpa.org.

1.05 REFERENCE STANDARDS

A. Editions of listed standards shall be as referenced by applicable codes, or most current edition if not referenced.

B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

D. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

F. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

G. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies.

H. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals

1. Product Data: Provide data on material characteristics, performance criteria, and limitations.
2. Shop Drawings: Provide drawings of special joint conditions.
    a. Document compliance with NFPA 285.
3. Testing:
    a. Provide data on NFPA 285 assemblies that VR/AIB products have been successfully tested and approved as part of the tested wall assembly.
    b. VR/AIB adhesion tests identified in FIELD QUALITY CONTROL paragraph in PART 3 of this section. Submit within 24 hours of completion of testing, for informational purposes.
4. Installer's qualification statement.
5. Subcontractor's written acceptance of substrate conditions.
6. Photographs of each portion of the installation, prior to covering up.
7. Testing agency qualification statement.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The WD&C Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Environmental Product Declarations (EPD).
        2) Health Product Declarations (HPD).

D. Closeout Submittals

1. Submit in accordance with Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals.
2. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Refer to Section 01 91 19 - Building Envelope Commissioning for requirements associated with building envelope commissioning applicable to this section.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years' documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.08 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.

1. See Section 01 40 00 - Quality Requirements 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.09 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. The work of this section is intended to create a continuous air barrier to control leakage into or out of the building, in accordance with the current edition of the applicable Energy Code and the following:
   1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
   2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials.
   3. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
   4. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Sealing shall allow for expansion, contraction and mechanical vibration. Joints and seams associated with penetrations shall be sealed in the same manner or taped. Sealing materials shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair the penetrations' ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
      a. Sealing of concealed fire sprinklers, where required, shall be in a manner that is recommended by the manufacturer.
      b. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.
      c. Recessed lighting fixtures shall comply with current edition of the applicable Energy Code. Where similar objects are installed that penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.
      d. Penetrations of the air barrier materials at the perimeter of openings such as doors, windows, curtainwalls, entry systems, louvers, ducts, pipes, conduit, electrical communication and security boxes, plumbing and HVAC piping or equipment, or other devices shall be coordinated with the installing contractor to ensure that perimeters are taped, caulked, or otherwise sealed.

B. The work of this section is required by MSBC to comply with the requirements of NFPA 285, and to use only products approved as part of NFPA 285 tested wall assemblies.

2.02 VAPOR RETARDERS / AIR INFILTRATION BARRIER (VR / AIB)

A. VR / AIB, Fluid-Applied:
   1. Material: Asphalt-free synthetic liquid rubber.
      a. Material shall be tested and approved as a Class 1 or Class II vapor barrier.
   2. Dry Film Thickness: 40 mils (0.04 inch).
   3. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
   4. Water Vapor Permeance: Less than 1 perm, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
   5. Solids Content: 50 percent minimum.
   6. VOC Content: Meeting VOC limitation requirements of project's sustainability goals and Authorities Having Jurisdiction, when applied to building exterior.
   7. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 60 days of weather exposure.
   8. Material shall comply with NFPA 285 requirements for wall assembly, and shall be included in a tested assembly that includes the rigid insulation product(s) being provided by the subcontractor(s) furnishing those products.

9. Material shall be capable of satisfying the building interface and joint conditions shown on drawings, and of spanning said joints to make connection to air barrier components being installed by other subcontractors, including foundation dampproofing and waterproofing, and roof vapor retarder.
10. Material shall be compatible with the following:
    a. Waterproofing.
    b. Insulation boards.
11. Joint Preparation Treatment / Transition Tape: Coating manufacturer's recommended method, either tape or reinforcing mesh saturated with coating material.
12. Pull adhesion to glass faced wall board: 12 psi when tested i accordance with ASTM D4541.
13. Elongation: 270 percent minimum when tested in accordance with ASTM D412.
14. Products: Subject to compliance with these specifications, provide products of one of the following:
    a. Carlisle Coatings and Waterproofing, Inc; Fire Resist Barritech NP: www.carlisleccw.com.
    b. GCP Applied Technologies; Perm-A-Barrier Liquid: www.gcpat.com.
    c. Henry Company; Air-Bloc 16MR fluid applied: https://henry.com.
    d. Sto Corp; Sto VaporSeal A1000V fluid applied (40 mil application): www.stocorp.com.
    e. W.R. Meadows, Inc; Air-Shield LSR: www.wrmeadows.com.
    f. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.03 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Adjacent Substrates: As indicated or in compliance with air barrier manufacturer's installation instructions.

B. Sealant and Sealant Backers: As specified in Section 07 92 00 - Joint Sealants: products compatible with VR / AIB materials and recommended by manufacturer.
    1. Comply with LEED for Schools v4/v4.1 VOC content requirements for exterior-applied products: see Section 01 81 13 - Sustainable Design Requirements.
    2. Application: Apply at 30 to 40 mil, 0.030 to 0.040 inch, nominal thickness.

C. Primer: As recommended by sealant manufacturer, included as part of an NFPA 285 tested assembly, appropriate to application, and compatible with adjacent materials

D. Flexible Flashing - - VR / AIB "Transition Tape": Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement waived if not installed on roof. Products as recommended by manufacturer for compatibility with VR / AIB, and compatible as part of the NFPA 285 assembly featuring the selected VR / AIB.

E. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready for work of this section.

B. Where existing conditions are responsibility of another installer, notify Construction Manager of unsatisfactory conditions.

C. Do not proceed with this work until unsatisfactory conditions have been corrected.

D. Submit written acceptance of substrate surfaces and conditions prior to commencing work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Installation shall comply with applicable state and local building and energy code requirements.

C. VR / AIB: Install continuous airtight barrier over surfaces indicated, with sealed seams and sealed joints to adjacent surfaces.

1. Ensure VR / AIB is clean, dry, and continuous.

D. VR / AIB: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

E. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

F. VR / AIB Coatings or Membranes:

1. Prepare substrate in accordance with manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.
2. Apply flashing transition tape to seal with adjacent construction, bridge joints in coating substrate, and seal across joints between dissimilar substrate materials. Comply with ASTM E2357.

G. Openings and Penetrations in Exterior VR / AIB:

1. At all openings, arrange and install perimeter flashings in "weatherboard" or shingle fashion (lowest to highest) to shed water across the assembly or opening.
2. At head of openings, install flashing under air barrier extending at least 2 inches beyond face of jambs; seal air barrier to flashing.
3. Service and Other Penetrations: Form flashing around penetrating item and seal to air barrier surface.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Owner will provide testing services: Construction Manager shall cooperate with Owner's testing agency.

1. Allow access to work areas and staging.
2. Notify ’s testing agency in writing of schedule for work of this section to allow sufficient time for testing and inspection.

C. Conduct pull adhesion tests of installed self-adhesive Vapor Retarder / Air Infiltration Barrier (VR/AIB) in accordance with ASTM D4541. Perform a minimum of three tests per day, with a minimum of one test on each substrate surface to which material is applied on that day. Identify specific area of building tested on each report. Submit each report within 24 hours of completion of test.

1. Remove and reapply or repair in a manner acceptable to the manufacturer materials that do not meet adhesion properties stated by manufacturer and/or stated in specifications.

D. Do not cover installed work of this section until required testing and inspections have been accepted.

E. Obtain approval of installation procedures from air barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

F. Take digital photographs of each portion of installation prior to covering up VR / AIB.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.06 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

B. Do not leave paper or felt-based barriers exposed to weather for longer than one week.

C. Do not expose backside of substrates to moisture or rain. Protect exposed back-up walls against wet weather conditions during and after application of membrane, including at wall openings, and at construction activity above completed air barrier installation.

D. Temporary protection shall divert water to the exterior.

END OF SECTION

SECTION 07 42 13
METAL WALL AND SOFFIT PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following work:
   1. Exterior wall panels.
   2. Soffit panels.
   3. Soffit vents.
   4. Subgirt framing assembly.
   5. Roof screen assemblies.
   6. Accessory components for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. MCA. Metal Construction Association; www.metalconstruction.org.

B. NFPA. National Fire Protection Agency; www.nfpa.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. MCA Preformed Metal Wall Specification Guidelines - MCA Preformed Metal Wall Specification Guidelines (Revised).

C. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Submit manufacturer’s printed product literature including specification and performance data indicating compliance with the project requirements.
      a. Submit documentation of NFPA 285 testing of wall assembly, including copy of approval and details of tested wall assembly.
   2. Shop Drawings: Submit field erection drawings indicating a complete panel layout with panel lengths used in each area, erection sequence, and coordination dimensions, layout, joints, construction details, support clips, and methods of anchorage.
      a. Provide details in a scale that clearly shows all conditions for this project. Include dimensions, layout, joints, and construction details of fabricated work; show adjacent project conditions; methods of anchorage; indicate type, size and spacing of all fasteners, metal thickness and finish.
      b. Show details of anchoring, joints, terminations, and penetrations of metal work.
   3. Samples: Submit three samples of wall panel and soffit panel, in full panel width by 12 inches minimum length, illustrating finish color, sheen, and texture.
   4. Test Reports: Submit test report verifying compliance with NFPA 285 for previously-tested exterior wall assembly.
   5. Installer's qualification statement.
   6. Testing agency's qualification statement.
   7. Specimen warranty.
   8. Subcontractor's written acceptance of substrate conditions: submit prior to commencing work of this Section.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Environmental Product Declarations (EPD).

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data: Operating, cleaning and maintenance recommendations.
    a. Basic Owner requirements to maintain warranty.
    b. Recommended maintenance guidelines and maintenance schedule.
3. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing products specified in this section with minimum three years of documented experience.

B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

C. See Section 01 91 19 - Building Envelope Commissioning for requirements association with building envelope commissioning applicable to this Section.

D. Products provided as part of this Section shall be approved per NFPA 285 as part of a tested wall assembly, which includes VR/AIB products as listed in Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers. This subcontractor shall coordinate with that section to coordinate the selection of products such that they are part of a single tested assembly.

1.06 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.
1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Finish Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

C. Special Warranty: Provide two-year warranty covering water tightness and integrity of seals of metal wall panels. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these specifications, provide products from one of the following:
   1. ATAS International, Inc; Design Wall DWF Profile: www.atas.com.
   2. Centria: www.centria.com. (Basis of Design)
   3. Metal Sales Manufacturing Corporation: www.metalsales.us.com.
   4. PAC-CLAD, a division of Carlisle Corporation: www.pac-clad.com.
   5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE / DESIGN CRITERIA

A. Components: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with MSBC (780 CMR). Design pressure as dictated by code.
   1. Wind Speed: As indicated in Structural Drawings.
      a. Exposure: As indicated in Structural Drawings.
      b. Importance Factor: As indicated in Structural Drawings.
   2. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
   3. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.

2.03 METAL WALL AND SOFFIT PANELS

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. Provide exterior wall panels, soffit panels, retrofit wall panels, and subgirt framing assembly.
   2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
   3. Design Pressure: In accordance with applicable codes and as indicated in structural drawings.
   4. Fire Performance: Tested in accordance with, and complying with acceptance criteria of NFPA 285.
   5. Maximum Allowable Deflection of Panel: L/180 for length(L) of span.
   6. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
   7. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
   8. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
   9. Color: As selected by Architect from manufacturer's full range of available colors.

B. Exterior Corrugated Panels:
   1. Minimum 22 gage thick corrugated panel. Corrugations 7/8 inch deep at 2.67 inches on center.
   2. Panels shall be 37-1/4 inches wide, in maximum panel lengths for installed applications, but not less than 6 feet long.

3. Design for edge and end lap with field-applied sealant at all panel joints.
4. Color: To be selected by Architect from manufacturer's full range of available colors.
5. Texture: Smooth.
6. Finish: Two-coat 70 percent polyvinylidene fluoride (PVDF.)

C. Prefinished Linear Metal Soffit (LMS) System:
1. System shall have 4 inch wide, 0.040 inch gauge, aluminum round edge beams with integral flush filler strips. System includes exterior symmetrical carrier, hanger wire, panel splices, perimeter trim, stabilizer bars, expansion carriers, seismic clips and other accessories necessary to provide a complete installation.
2. Finish: Two-coat 70 percent polyvinylidene flouride (PVDF).
3. Color to be selected by Architect from manufacturer's full range of available colors.
4. Basis of Design: LCR with Filler Strip by ATAS, or an Architect-acceptable equivalent.

D. Retrofit Wall Panels:
1. Profile: Vertical; style as indicated.
2. Side Seams: Lapped.
3. Condensation Control: Factory-applied membrane to reduce drips resulting from backside condensation.
4. Panel Width: ___ inches.

2.04 SOFFIT VENTS

A. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
1. Cor-A-Vent; S-400: www.cor-a-vent.com.
2. GAF; Cobra FasciaFlow: www.gaf.com.
3. _____
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Material: Polypropylene or PVC.

C. Width: 1 to 1.25 inch.

2.05 ROOF SCREEN ASSEMBLIES

A. System shall be corrugated panel designed for exterior use.

B. Panel to be .040 inch thick aluminum, minimum. Depth to be 7/8 inch.

C. Finish: 70 percent polyvinylidene fluoride (PVDF).

D. Texture: Smooth.

E. Color: To be selected by Architect from manufacturer’s full range of standard, non-standard, and custom colors.

F. Accessories required for a complete installation, including but not limited to fasteners, and trims from manufacturer’s complete line of trims available in matching colors, gage, and finish. See drawings.

G. Fastening method: Exposed fasteners. Match fastener color to metal panels.

2.06 MATERIALS

A. Rigid Insulation: Provide per the materials specified in Section 07 21 00 - Thermal Insulation.
1. Provide board sizes that fit tightly between siding supports. Gaps at supports and between boards shall be sealed per Section 07 21 00 - Thermal Insulation.

2.07 ACCESSORIES

A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.

B. Sealants: Manufacturer's standard type suitable for use with installation of system; non-staining.
   1. Color: To be selected by Architect from manufacturer's full range of available colors.

C. Fasteners: Manufacturer's standard type to suit application; stainless steel. Exposed fasteners same finish as panel system, with gasketed heads.

D. Sub girts: Type 304 stainless steel.

E. Field Touch-up Paint: As recommended by panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas with installer present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, surfaces, substrates, structural support, utility connections, tolerances, humidity, moisture, cleanliness and other conditions are satisfactory, and ready to receive work.
      b. Proceed with installation only after unsatisfactory conditions have been corrected.
   2. Verify that building framing members are ready to receive panels.
   3. Submit written acceptance of substrate surfaces and conditions prior to commencing installation of the work of this Section.

3.02 PREPARATION

A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane, and spaced at intervals indicated.

3.03 INSTALLATION

A. Install rigid insulation at metal siding panels in accordance with the installation requirements of Section 07 21 00 - Thermal Insulation.
   1. Tightly fit boards to adjacent wall insulation provided by other sections to avoid gaps and thermal bridging.

B. Install panels on walls and soffits in accordance with manufacturer's instructions.

C. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint; allow to dry prior to wall panel installation.

D. Fasten panels to structural supports; aligned, level, and plumb.

E. Locate joints over supports.

F. Lap panel ends 2 inches, minimum.

G. Provide expansion joints where indicated.

H. Use concealed fasteners unless otherwise indicated by Architect.

I. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

J. Align panel joints at mitered soffit corners.

3.04 TOLERANCES

A. Offset From True Alignment Between Adjacent Members Abutting or In Line: 1/16 inch, maximum.

B. Variation from Plane or Location As Indicated on Drawings: 1/8 inch, maximum.

3.05 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items.

1. Completed work shall be in orientation and plane indicated on drawings, true and free of dents.
2. Panel ribs shall be on the module indicated on the reviewed layout drawings and within the tolerance as set forth in the MCA Preformed Metal Wall Specification Guidelines and allowed by the actual construction dimensions.
3. Finish touch-up damaged surface finishes.
4. Panels that are badly damaged and, in the judgment of the Architect, cannot be repaired- shall be removed from the jobsite and replaced with acceptable material.

3.06 CLEANING / PROTECTION

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal, and as follows:
   1. Remove site cuttings from finish surfaces.
   2. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

B. Protect installed work from construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 07 42 14
METAL COMPOSITE MATERIAL WALL PANELS

PART 1 GENERAL

1.01 FILED SUB-BID REQUIRED

A. The work of this Trade Bid Section shall be included in the Roofing and Flashing Trade Bid. Refer to Section 07 00 02 - Roofing and Flashing Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following metal composite material work:
   1. Self-draining, self-supporting, back ventilated exterior rainscreen system consisting of formed metal composite material (MCM) with thermally broken, discontinuous back-up system, including sheet, framing, dry seal joint closure trim, secondary supports, and anchors to structure.
   2. Exterior cladding including wall panels, roof edge fascia panels, and soffit panels, consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup.
   3. MCM soffit panel system, to match wall panel system.
   4. Matching flashing and trim.
   5. Accessories for a complete installation.

B. The wall panel contractor shall seal and make all of their penetrations through the VR/AIB airtight, and shall be responsible for confirming sealant is properly installed and that penetrations are airtight. VR/AIB membrane flashing and sealant shall be furnished by the Waterproofing, Dampproofing and Caulking Trade Contractor and installed by the wall panel contractor. The wall panel contractor shall be responsible for ensuring that through-wall flashings shall be sealed to the VR/AIB system in coordination with product selection to provide materials approved as part of an NFPA 285 tested wall assembly. Anchor sealing shall be included and reviewed in mock-up prior to installation.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association; www.aamanet.org.

B. ASTM. ASTM International; www.astm.org.

C. MSBC 780 CMR. Massachusetts State Building Code: www.mass.gov/code-of-massachusetts-regulations-cmr.

D. NFPA. National Fire Protection Agency; www.nfpa.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

C. 780 CMR - Massachusetts State Building Code.

D. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

F. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

G. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives.
H. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics.
I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
L. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene within one month of Award of Contract, before starting work of this section to verify project requirements, coordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements. Attendance by the designer is required.
   1. Require attendance by the installer and relevant sub-contractors.
   2. Include MCM sheet manufacturer’s representative and wall system manufacturer’s representative to review storage and handling procedures.
   3. Review in detail truck transportation, parking, vertical transportation, schedule, personnel, installation of adjacent materials and substrate.
   4. Review procedures for protection of work and other construction.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
      a. Finish manufacturer's data sheet showing physical and performance characteristics.
      b. Storage and handling requirements and recommendations.
      c. Fabrication instructions and recommendations.
      d. Specimen warranty for finish, as specified herein.
   2. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
      a. Physical characteristics of components shown on shop drawings.
      b. Storage and handling requirements and recommendations.
      c. Installation instructions and recommendations.
      d. Specimen warranty for wall system, as specified herein.
   3. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, support clips, exposed fasteners, number of anchors, supports, reinforcement, trim, flashings, and accessories.
      a. Indicate panel numbering system.
      b. Differentiate between shop and field fabrication.
      c. Indicate substrates and adjacent work with which the wall system must be coordinated.
      d. Include large-scale details of anchorages and connecting elements.
      e. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches.
      f. Include design engineer's stamp or seal on shop drawings for attachments and anchors.

4. Selection Samples: For each finish product specified, submit at least three sample color chips representing manufacturer's standard range of available colors and patterns.
   a. Sealant Color: Color to match wall panels.
5. Verification Samples: For each finish product specified, submit at least three samples, minimum size 12 inch square, and representing actual product in color and texture.
6. Design Data: Submit structural calculations stamped by design engineer, for Architect's information and project record.
7. Test Report: Submit report of full-size mock-up tests for air infiltration, water penetration, and wind performance.
8. Engineering Judgment Letter: Submit a letter, specific to this project, documenting compliance of metal composite material panel wall assembly with NFPA 285 fire performance requirements.
9. Test Report: Submit test report verifying compliance with NFPA 285 for previously-tested exterior wall assembly.
10. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.
11. Designer's qualification statement.
12. Installer's qualification statement.
13. Testing agency's qualification statement.
14. Specimen warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer recycled content.
         2) Environmental Product Declarations (EPD) and Health Product Declarations (HPD).

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Maintenance Data: Care of finishes and warranty requirements.
   3. Touch-up materials: Provide touch-up materials and products to Owner, obtained from the metal composite material wall panel manufacturer.
   4. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   5. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.07 QUALITY ASSURANCE

A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.

B. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a Structural Engineer experienced in design of this type of work and licensed in Massachusetts.

C. Installer Qualifications: Company specializing in performing work of type specified in this section.
   1. With minimum three years of documented experience.
   2. Approved by wall panel system manufacturer.
   3. Submit contact names and phone numbers for at least three references connected with successful past projects.

D. Testing Agency Qualifications: Independent agency experienced in testing assemblies of the type required for this project and having the necessary facilities for full-size mock-up testing of the type specified.

E. Single Source Requirement: Provide all Metal Composite Material Wall Panels on project from a single manufacturer.

F. See Section 01 91 19 - Building Envelope Commissioning for requirements association with building envelope commissioning applicable to this section.

G. Products provided as part of this Section shall be approved per NFPA 285 as part of a tested wall assembly, which includes VR/AIB products as listed in Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers. This subcontractor shall coordinate with that ection to coordinate the selection of products such that they are part of a single tested assembly.

1.08 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.
   1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
   1. Protect finishes by applying heavy-duty removable plastic film during production.
   2. Package for protection against transportation damage.
   3. Provide markings to identify components consistently with drawings.
   4. Exercise care in unloading, storing, and installing panels to prevent bending, warping, twisting, and surface damage.

C. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
   1. Store in well-ventilated space out of direct sunlight.
   2. Protect from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
   3. Store at a slope to ensure positive drainage of accumulated water.
   4. Do not store in enclosed space where ambient temperature can exceed 120 degrees F.
   5. Avoid contact with other materials that might cause staining, denting, or other surface damage.

1.10 FIELD CONDITIONS

A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

1.11 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Special Warranty: Provide 2-year warranty covering water tightness and integrity of seals of wall panels. Complete forms in Owner's name and register with warrantor.

C. Finish Warranty: Provide 5-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Composite Material (MCM) Sheet Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. ALUCOBOND by 3A Composites USA; Alucobond: www.alucobondusa.com.
   2. ALPOLIC Materials; ALPOLIC/fr (Fire Retardant core): www.alpolic-americas.com.
   3. ATAS International, Inc: www.atas.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Wall Panel System Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. Centria Architectural Systems; www.centria.com.
   2. Doralco Architectural Metal Solutions; www.doralco.com.
   3. PCI LYMO Architectural Panel Systems Inc.: Back-ventilated metal composite material panel rainscreen system; www.performancecontracting.com. (Basis of Design)
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 WALL PANEL SYSTEM

A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by provided by other sections of these specifications; provide installed panel system capable of maintaining specified performance without defects, damage, or failure.
   1. Provide structural design by or under direct supervision of a Structural Engineer licensed in Massachusetts.
   2. Provide panel jointing and weatherseal using a "wet", sealant-sealed system.
   3. Anchor panels to supporting framing without exposed fasteners.

2.03 PERFORMANCE REQUIREMENTS

A. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
   1. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F to 180 degrees F without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.

B. Wind Performance: Provide system tested in accordance with ASTM E330/E330M without permanent deformation or failures of structural members under the following conditions:
   1. Design Wind Pressure: As specified in MSBC 780 CMR.
   2. Inward Design Wind Pressure: As indicated in Structural Drawings.

3. Outward Design Wind Pressure: As indicated in Structural Drawings.
4. Importance Factor: As indicated in Structural Drawings.
5. Maximum deflection of perimeter framing member of L/175 normal to plane of the wall; maximum deflection of individual panels of L/60.
6. Maximum anchor deflection in any direction of 1/16 inch at connection points of framing members to anchors.

C. Water Penetration: No water penetration under static pressure when tested in accordance with ASTM E331 at a differential of 10 percent of inward acting design load, 6.27 psf minimum, after 15 minutes.
1. Water penetration is defined as the appearance of uncontrolled water on the interior face of the wall.
2. Provide joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on inside face of panel system.
3. Design to drain leakage and condensation to the exterior face of the wall.

D. Fire Performance: Tested in accordance with, and complying with the acceptance criteria of, NFPA 285; testing performed for previous project is acceptable provided tested system was truly equivalent.

2.04 PANELS

A. Panels: 2-1/2-inch deep pans formed of metal composite material sheet by routing back edges of sheet, removing corners, and folding edges.
1. Reinforce corners with riveted aluminum angles.
2. Provide concealed attachment to supporting structure by adhering attachment members to back of panel; attachment members may also function as stiffeners.
3. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.
4. Secure members to back face of panels using structural silicone sealant approved by MCM sheet manufacturer.
5. Fabricate panels under controlled shop conditions.
6. Where final dimensions cannot be established by field measurement before commencement of manufacturing, make allowance for field adjustments without requiring field fabrication of panels.
7. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
    a. Make panel lines, breaks, curves, and angles sharp and true.
    b. Keep plane surfaces free from warp or buckle.
    c. Keep panel surfaces free of scratches or marks caused during fabrication.
8. Provide joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on inside face of panel system.
9. For "dry" jointing, secure extrusions to returned pan edges with stainless steel rivets; provide means of concealed drainage with baffles and weeps for water that might accumulate in members of system.
10. Provide "wet seal" jointing at skyward facing joints and where indicated on Drawings.

2.05 MATERIALS

A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.
1. Overall Sheet Thickness: 0.118 inch, minimum.
2. Face Sheet Thickness: 0.019 inch, minimum.

3. Alloy: Manufacturer's standard, selected for best appearance and finish durability.
4. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F.
5. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
6. Flammability: Self-ignition temperature of 650 degrees F or greater when tested in accordance with ASTM D1929.
7. Panel Flatness: Maximum allowable distortion of 1/32 inch in two feet in any direction.

B. Thermally Broken Rainscreen Attachment: Include Type 304 stainless steel sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation and anchorage to back-up wall construction. System shall be pre-engineered to satisfy rainscreen cladding system requirements.
   1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. Cascadia Clip: www.cascadiawindows.com.
      b. Green Girt: www.greengirt.com. (Basis of Design)
      c. Knight Wall System: www.knightwallsystems.com.
      d. EXO-TEC; Stand-Off MPV Bracket: www.exo-tec.biz.
      e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Provide material strength, dimensions, configuration per requirements to meet the applied loads applied and in compliance with applicable building code.
   3. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.
   4. Stainless Steel Sheet Components: ASTM A480/A480M.

2.06 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, with at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected by Architect from manufacturer’s standard line.

B. Color/Texture: As selected by Architect from manufacturer's standard range.

C. Provide manufacturer's standard paint finish at non-exposed side of panels.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine dimensions, tolerances, and interfaces with other work.

B. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

D. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect adjacent work areas and finish surfaces from damage during installation.

B. Provide anchorage items to be cast into concrete or built into masonry to appropriate installer(s) together with setting templates.

1. See Section 03 30 00 for additional cast-in-place concrete requirements.
2. See Section 04 20 00 for additional unit masonry requirements.

3.03 INSTALLATION

A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.

B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.

C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.

D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.

E. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.

F. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.

G. Where joints are designed for field-applied sealant, seal joints completely with specified sealant.

H. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:

1. Variation From Plane or Location: 1/2 inch in 30 feet of length and up to 3/4 inch in 300 feet, maximum.
2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet run, maximum.
3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet run, maximum.
4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch, maximum.

I. Replace damaged products.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.

3.05 CLEANING

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements and 01 74 19 - Construction Waste Management and Disposal for additional requirements, and as follows:

1. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
2. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
3. Remove temporary coverings and protection of adjacent work areas.
4. Clean installed products in accordance with manufacturer's instructions.

3.06 PROTECTION

A. Protect installed panel system from damage until Date of Substantial Completion.

END OF SECTION

SECTION 07 54 00
THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 TRADE CONTRACT REQUIRED

A. The work of this Section shall be included in the Roofing Flashing and Sheet Metal Trade Contract. See Section 07 00 02 - Roofing and Flashing Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following Membrane roofing system work:
   1. Insulation, flat and tapered with insulation crickets, as specified in Section 07 21 00 - Thermal Insulation .
   2. Vapor retarder.
   3. Fire resistant deck sheathing.
   4. Cover boards.
   5. Flexible flashings and accessories.
   6. Sealers and adhesives.
   7. Expansion joint materials.
   8. Accessories required for a complete installation, including but not limited to roofing cant strips, stack boots, roofing expansion joints, and walkway pads.

B. Work installed by this section, but furnished from other sections includes:
   1. Section 07 72 00 - Roof Accessories: dryer vent boots and elevator hoistway vent.
   2. Division 22 - Plumbing: Roof drains: Plumbing Trade Contractor to provide and install drain body; roofer to install clamping ring and strainer basket.
   3. Division 23 - HVAC: Roof curbs: HVAC Trade Contractor to furnish and install curb; roofer to furnish and install membrane flashing and counterflashing.

C. Materials specified in other sections, to be fabricated, furnished, delivered, and installed by this Section include:
   1. Section 07 21 00 - Thermal Insulation: rigid polyisocyanurate insulation board that is part of the roofing system.
   2. Section 07 62 00 - Sheet Metal Flashing and Trim: work under manufacturer’s warranty: flashing and sheet metal work not provided under other sections of the Specifications, required for a complete, watertight construction.
      a. Metal flashings and accessories.
      b. Pre-finished metal scuppers.

D. Temporary flashing protection of phased roofing construction.
   1. Provide protection from the elements when cutting involves exterior walls or roof. The roofing and flashing Trade Contractor shall provide temporary protection of roofing removal areas and roofing cutting and patching areas.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.

B. ASCE. American Society of Civil Engineers; www.asce.org.

C. ASTM. ASTM International; www.astm.org.

D. FM. Factory Mutual; www.fmapprovals.com

E. NRCA. National Roofing Contractors Association; www.nrca.net.

F. SPRI. Single Ply Roofing Industry; www.spri.org.

G. UL. Underwriters Laboratories; www.ul.com.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:

B. ANSI/SPRI FX-1 - American National Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.

C. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems.

D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

E. ASTM C1153 - Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging.

F. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

G. ASTM D471 - Standard Test Method for Rubber Property--Effect of Liquids.

H. ASTM D573 - Standard Test Method for Rubber—Deterioration in an Air Oven.

I. ASTM D751 - Standard Test Methods for Coated Fabrics.

J. ASTM D1149 - Standard Test Methods for Rubber Deterioration-Cracking in an Ozone Controlled Environment.

K. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.

L. ASTM D5957 - Standard Guide for Flood Testing Horizontal Waterproofing Installations.

M. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing.

N. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.

O. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

P. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

Q. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

R. FM (AG) - FM Approval Guide.

S. FM 4470 - Examination Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction.

T. NRCA (RM) - The NRCA Roofing Manual.

U. NRCA (WM) - The NRCA Waterproofing Manual.

V. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination, and as follows:

1. Coordinate with installation of associated counterflashings installed under other sections.

B. Preinstallation Meeting per Section 01 70 00 - Execution and Closeout Requirements, and as follows:

1. Preinstallation Meeting: Convene one week before starting work of this Section. Require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.
2. Review preparation and installation procedures and coordinating and scheduling required with related work.

C. Sequencing and Scheduling per Section 01 32 16 - Construction Progress Schedule.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals

1. Product Data: Provide data indicating all components and materials of the roof membrane system, including membrane, cover board, fire resistant deck sheathing, flashing materials, insulation, vapor retarder, and fasteners.
2. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and mechanical fastener layout.
    a. Outline of roof with roof size and elevations shown.
    b. Show layout of the tapered insulation and proposed membrane seam layout
    c. Proposed 20-year system manufacturer’s details.
        1) Indicate where variations occur particular to this project.
        2) Indicate each non-standard detail meeting 20-year warranty requirements verified by system manufacturer.
    d. Profile details of flashing methods for penetrations.
    e. Fastener and adhesive patterns.
3. Samples for Verification: Submit three samples for each of the following:
    a. 12 by 12 inch square of:
        1) Sheet roofing, of color specified including T-shaped side and end lap seam.
        2) Cover board.
        3) Roof insulation.
        4) Fire-resistant deck sheathing.
    b. 12 inch (300mm) length of:
        1) Metal termination bars.
        2) Battens.
    c. Unit Items:
        1) Typical plumbing vent flashing.
        2) Pre-finished scupper with leader box.
        3) Pre-finished metal flashing used under roofing warranty.
    d. Three fasteners of each type, length, and finish proposed to anchor system components.
4. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
5. Certifications:
    a. Manufacturer: Submit certification that all materials supplied comply with each specified ASTM requirement, and industry standards or practices.
        1) Certification of the manufacturer's warranty reserve.
        2) Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
    b. Applicator: Submit certification that the roofing system installed meets each identified code and insurance requirement specified.
6. Test and Evaluation Reports: For each component of membrane roofing system.
7. Trade Contractor's documentation of acceptance of properly functioning roof drainage and substrate conditions per Part 3 of this Section.
8. Trade Contractor testing log of roof membrane seam welds.

9. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
10. Installer's qualification statement.
11. Testing firm's qualification statement.
12. Specimen warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Roofing and Flashing Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.
         2) Environmental Product Declarations (EPD).
         3) Heat Island Effect - Roof: Submit testing documentation of solar reflective index for color chosen.

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Operation and Maintenance Data: Operating, cleaning and maintenance recommendations.
      a. Basic Owner requirements to maintain warranty.
      b. Recommended maintenance guidelines and maintenance schedule.
   3. Warranty Documentation:
      a. Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
      b. Submit roofing installer's written verification that installation complies with warranty conditions for waterproof membrane.
      c. Submit roofer's workmanship warranty.

1.07 QUALITY ASSURANCE

A. Regulatory Agency Approvals:
   1. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FM, or another testing and inspecting agency acceptable to AHJ. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
      a. Exterior Fire-Test Exposure: Class A per ASTM E108, for application and roof slopes indicated.
      b. Fire-Resistance Ratings of Roof Assemblies: ASTM E119.

B. Installer Qualifications: Company with a minimum of five years' experience that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product, and that is eligible to receive manufacturer's warranty.
   1. The work shall be supervised by a foreman who has received and successfully completed the manufacturer's training.

2. Applicator shall certify to roof system manufacturer that all work has been done in strict accordance with the contract specifications and manufacturer's requirements.

C. Source Limitations: Obtain each component for membrane roofing system from roofing membrane manufacturer or its designated distributor.

D. Perform work in accordance with NRCA (RM) and NRCA (WM) and manufacturer's instructions.

E. Building envelope commissioning will be provided for this project by the Owner. This subcontractor shall cooperate fully with the building Commissioning Agent to provide access for testing of installed materials, and to repair or remediate conditions identified by the building Commissioning Agent in order to obtain his acceptance of installed work. Testing of completed roofing systems will be performed by the Owner's testing agent and/or the building Commissioning Agent, and include the following:

1. Infrared thermal imaging scan per ASTM C1153, to identify areas of potentially wet insulation. The roofing subcontractor shall perform test cuts when requested by the Architect or building Commissioning Agent to investigate potentially wet insulation identified by thermal scans, and replace materials found to be damaged or defective. The extent of damaged material shall be determined at the discretion by the Architect or building Commissioning Agent based on the interpretations of the thermal scans.
2. Fastener pull-out resistance per ANSI/SPRI FX-1. At a minimum three tests will be performed for each roof deck type and fastener combination.
3. Roof Drain Flood Testing in accordance with ASTM D5957, utilizing a 10 foot by 10 foot area around each drain tested. A minimum of two roof drains will be tested. This contractor shall provide labor to provide a non-penetrating temporary flood basin to facilitate the testing, and assist with and witness said testing procedures, and remove the temporary testing basin following successful testing.

1.08 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.

1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 - Product Requirements, and the following:

1. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact, unless otherwise indicated.
2. Store materials in weather protected environment, clear of ground and moisture.
3. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
4. Handle materials to prevent damage. Place materials on pallets and fully protect from moisture.
    a. Waterproof Covering: Allow sufficient ventilation to prevent condensation build-up or moisture entrapment in the materials.
5. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins.
    a. Un-vented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions, which may affect the ease of membrane installation.
6. Adhesives shall be stored at temperatures between 40 degrees F (5 degrees C) and 80 degrees F (27 degrees C).

7. Flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
8. Damaged materials, as determined by the Owner's representative or manufacturer, are to be removed from the job site and replaced at no cost to the Owner.
9. Insulation, fire resistant deck sheathing, and cover board shall be kept dry during storage and application. If insulation, fire resistant deck sheathing, or cover board becomes wet, it shall not be installed (even if it is later dried). Immediately remove wet insulation boards from the site and dispose of.
10. Applicator shall take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.
11. Protect foam insulation from direct exposure to sunlight.

1.10 WARRANTY

A. Manufacturer / Special Warranty: Prepare and submit written Total Roofing System warranty covering materials and labor signed by manufacturer of roofing materials and his authorized applicator, without monetary limitation, agreeing to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
   1. Failure includes, but is not limited to, leaking roof, damage from wind not in excess of warranty limit, membrane delaminating, fastener pull-out, improperly heat-welded seams, improper terminations.
   2. Warranty Term: 20 years from Substantial Completion.
   3. Warranty Wind Speed: Not less than 120 miles per hour. Provide special warranty rider if required by manufacturer.
   4. Failure includes, but is not limited to, leaking roof, membrane delaminating, fastener pull-out, improperly heat-welded seams, improper terminations.
   5. System warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover board and other components of roofing system.
   6. Exceptions are not Permitted:
      a. Damage due to roof traffic.
      b. Damage due to wind speed equal to or less than warrantied wind speed limit.

B. Roofer's Workmanship Warranty:
   1. Refer to Section 07 00 02 - Roofing and Flashing Trade Bid Summary.
   2. Roofer shall provide a separate three-year warranty for the thermoplastic membrane roofing system.
      a. Special Requirements: The Applicator shall supply the Owner with a three-year warranty separate from the manufacturer warranty. In the event any work related to roofing, flashing, or metal is found to be defective, installed improperly, or otherwise not in accordance with the Contract Documents within this warranty term, the Roofing and Flashing Trade Contractor shall repair that defect at no cost to the Owner. This warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer and Architect.
   3. Warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer and Architect.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Thermoplastic Polyolefin (TPO) Membrane Roofing Materials: Subject to compliance with these Specifications and project's LEED goals including availability of Environmental Product Declarations (EPD) and Health Product Declarations (HPD), provide products from one of the following manufacturers:

1. Carlisle SynTec Systems; Sure-Weld TPO: www.carlisle-syntec.com/.
2. Elevate: www.holcimelevate.com.
3. GAF; EverGuard TPO: www.gaf.com.
4. Johns Manville: www.jm.com.
5. Versico Roofing Systems: www.versico.com.
6. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
    a. PVC Membrane systems are not considered to be equivalent products and will not be accepted.

B. Insulation: Products of same manufacturer or approved by roofing manufacturer.

2.02 DESCRIPTION

A. Regulatory Requirements:
1. Assembly Wind Rating: Refer to requirements of Structural Drawings.
2. Wind Speed Rating: Refer to requirements of Structural Drawings.
3. Assembly Fire Rating: FM Class 1, ASTM E108/ UL 790, Class A.
4. Wind Uplift: Refer to requirements of Structural Drawings and ASCE 7.

B. Sustainable Requirements:
1. Provide Environmental Product Declarations (EPD) and Health Product Declarations (HPD) if available for selected products.
2. Membrane fire retardant additive shall be non-halogenated type.

2.03 ROOFING - UNBALLASTED APPLICATIONS

A. Roofing Assembly Requirements:
1. Solar Reflectance Index (SRI): 82, minimum, calculated in accordance with ASTM E1980.
    a. Field applied coating may not be used to achieve specified SRI.
2. Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
3. Insulation Thermal Resistance (R-Value): 5.7 per inch, minimum; provide insulation of thickness required.

B. Acceptable Insulation Types - Constant Thickness Application: Any of types specified.
1. Minimum 2 layers of polyisocyanurate board.
2. Bottom layer of cellulose, perlite, molded polystyrene, polyisocyanurate, glass fiber, extruded polystyrene, composite, or cellular glass board covered with single layer of cellulose, perlite, molded polystyrene, polyisocyanurate, glass fiber, extruded polystyrene, or composite board.

2.04 MEMBRANE ROOFING AND ASSOCIATED MATERIALS

A. Membrane Roofing Materials:
1. TPO: Thermoplastic polyolefin (TPO) complying with ASTM D6878/D6878M, sheet contains reinforcing fabrics or scrims.
    a. Thickness: 80 mil, 0.080 inch, minimum.
2. Breaking Strength: Minimum 350 lbf (1 kN); ASTM D751, grab method.
3. Elongation at Break: 15 percent; ASTM D751.
4. Tearing Strength: 55 lbf (245 N) minimum; ASTM D751, Procedure B.
5. Brittleness Point: Minus 40 degrees F (30 degrees C)

6. Ozone Resistance: No cracks after sample, wrapped around a 3 inch (75mm) diameter mandrel, is exposed for 166 hours to a temperature of 104 degrees F (40 degrees C) and an ozone level of 100 ppm (100 mPa); ASTM D1149.
7. Resistance to Heat Aging: 90 percent minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 degrees F (116 degrees C); ASTM D573.
8. Water Absorption: Less than 4 percent mass change after 166 hours of immersion at 158 degrees F (70 degrees C); ASTM D471.
9. Linear Dimension Change: Plus or minus 2 percent; ASTM D1204.
10. Sheet Width: Factory fabricated into widest possible sheets.
11. Color: White.

B. Membrane Adhesive: Water Based Bonding Adhesive required by membrane manufacturer to meet system warranty for substrate and other project conditions.
   1. Basis of Design Product and Manufacturer: Aqua Base 120 Bonding Adhesive by Carlisle, or equal, as system and manufacturer requirements dictate.
      a. Exception: When temperatures do not allow use of water-based adhesive use Sure-Seal FAST™ by Carlisle or equal low-VOC solvent-based adhesive recommended for system used.

2.05 FLASHING

A. Flexible Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 60 mil (1.5 mm) thick, minimum, of same color as sheet membrane approved for use with adhered roofing systems.
   1. Types:
      a. Heat Weldable Non-Reinforced T-Joint Flashing.
      b. Heat Weldable Walkway Pads.
      c. Pre- Molded Pipe Flashings.
      d. Split Pipe Seals.
      e. Corners.
      f. TPO Curb Wrap Corners.
      g. Molded Sealant Pockets.
   2. Acceptable Manufacturers / Products: Selections subject to compliance with requirements from one of the following products:
      a. Carlisle Sure-Weld TPO System Accessories; www.carlisle-syntec.com.
      b. Holcim Elevate TPO Roofing System Accessories; www.holcimelevate.com.
      c. Versico Versi-Weld Accessories; www.versico.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.06 FIRE RESISTANT DECK SHEATHING AND COVER BOARD

A. Deck Sheathing: Glass-mat faced gypsum panels complying with ASTM C1177/C1177M.
   1. Thickness: 1/2 inch, fire-resistant.
   2. Products:
      a. Georgia-Pacific; DensDeck Prime with EONIC Technology: www.densdeck.com/#sle.
      b. USG Corporation; Securock Ultralight Glass-Mat Roof Board: www.usg.com/#sle.
      c. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.07 COVER BOARDS

A. Cover Boards: Same product as Deck Sheathing, above.
   1. Thickness: 1/2 inch, fire resistant.
   2. Minimum compressive strength: 900 psi.

2.08 INSULATION

A. As specified in Section 07 21 00 - Thermal Insulation, for polyisocyanurate board insulation, and acceptable to roofing manufacturer as part of roofing system and covered under roofing system warranty. Installed by this Section.
   1. Insulation shall meet all identified code / insurance requirements.
   2. Insulation shall be approved in writing by insulation manufacturer for intended use, and for use with membrane materials.
   3. Insulation shall be compatible with roof membrane.
   4. Insulation panels shall not exceed 4 feet by 4 feet in size.
   5. Provide minimum two layers of insulation to achieve the thickness indicated for each roof type. Where multiple layers are used, insulation thickness shall be a minimum of 2-1/2 inches for first layer, 2-1/2 for second layer, with a built-up thickness of not less than 5 inches. Offset joints between layers of insulation. Tapered insulation shall be in addition to and above the minimum thicknesses indicated, such that no area has less than the minimum thickness. Taper of material shall be 1/4 inch per foot.

B. Insulation Manufacturer’s warranty:
   1. If manufacturer-accepted non-proprietary insulation is used, insulation manufacturer shall send in writing to the roofing contractor and roof manufacturer its recommendations for the use of the product, including:
      a. Name of specific project
      b. Statements which express the warranty conditions for the successful performance of their insulation for the duration of the roof system warranty
      c. Recommended procedures for attachment of insulation to deck, including quantity density and/ or spacing.
      d. Approval for use of roof system adhesives for bonding membrane directly to insulation.

2.09 VAPOR RETARDER / AIR BARRIER (VR)

A. Vapor Retarder: Complying with requirements of fire rating classification; compatible with roofing and insulation materials, self-adhering membrane with adhesive laminated to nonwoven fabric, fabricated specifically for the intended purpose.
   1. Product meeting air barrier requirements of building code as an air barrier, less than 0.004 cfm per square foot at 1.57 psf air permeance when tested in accordance with ASTM E2178.
      a. Products:
         1) Carlisle Syn Tec: 725 TR.
         2) Holcim Elevate: V Force vapor barrier membrane.
         3) Versico Inc: 725.
         4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Provide all accessories required by manufacturer for substrate conditions and for a complete installation, including lap sealants, primers, and adhesives.

2.10 ACCESSORIES

A. Prefabricated Roofing Expansion Joint Flashing: Sheet butyl over closed-cell foam backing seamed to galvanized steel flanges.

B. Cant Strips: Wood; pressure preservative treated.

C. Sheathing Adhesive: Noncombustible type, for adhering gypsum sheathing to metal deck.

D. Sheathing Joint Tape: Paper type, six inches wide, self adhering.

E. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.

F. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.

1. Length required for thickness of insulation material and penetration of deck substrate, with metal washers.

G. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

H. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.

I. Insulation Adhesive: As recommended by insulation manufacturer.

J. Sealants: As recommended by membrane manufacturer.

K. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane. Install walkways at all traffic concentration points (such as roof hatches, access doors and rooftop ladders) and all locations as identified by the Drawings. Heat weld walkway membrane pads/rolls to membrane as recommended by membrane manufacturer.

1. Composition: Roofing membrane manufacturer's standard.

L. Metal Termination Bars/Reglets: Manufacturer's standard predrilled stainless steel or extruded aluminum or aluminum bars, approximately 1 by 1/8 inch (25 by 3mm) thick; with anchors for use at walls and large curbs. Use prefabricated reglet mitered inside and outside corners where walls intersect.

M. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

N. Exposed Fasteners: Type 304 stainless factory-coated steel fasteners and [plastic] plates meeting corrosion-resistance provisions in FM 4470 or ASCE 7, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

O. Roof edge metal securement: ANSI/SPRI/FM 4435/ES-1 compliant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements, and as follows:

1. Weather Conditions: No rain, snow or frost, and none in the immediate forecast.

B. Work Conditions:

1. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care shall be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrane system.
2. Only as much of the new roofing as can be made weather-tight each day, including all flashing, insulation, cover board, and detail work, shall be installed. Insulation and cover board must be covered by membrane same day as laid. Each seam shall be cleaned and made watertight before leaving the job site that day.
3. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The building and its contents shall be protected against all

risks. Avoid over-use of non-vented direct-fired heaters during winter months. Do not apply cover board during rains, heavy fogs and other conditions that may deposit moisture on the surface.

4. All surfaces to receive new insulation, membrane, metal roof deck, roofing material of any type, or flashings shall be dry. Should surface moisture occur the Roofing and Flashing Trade Contractor shall provide the necessary equipment to dry the surface prior to application.
5. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
6. Uninterrupted water-stops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Water-stops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.
7. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is required, the Roofing and Flashing Trade Contractor shall provide protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over felt or plywood over insulation board shall be provided for all roof areas to receive rooftop traffic during construction.
8. Prior to and during application, all dirt, debris and dust shall be removed from surfaces by vacuuming, sweeping, and similar non-air borne methods.
9. All rooftop contamination that is anticipated or that is occurring shall be reported to the manufacturer to determine the corrective steps to be taken.
10. Roofing and Flashing Trade Contractor shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Roofing and Flashing Trade Contractor shall report any such blockages in writing to the Owner's representative for corrective action prior to installation of the roof system. Submit written acceptance of roof drainage system prior to commencing work of this section.
11. Prior to installation inspect substrate surfaces. Identify any unsuitable substrate surfaces or conditions to the Construction Manager prior to commencing with work of this section. Submit written acceptance of substrate surfaces and conditions prior to commencing work of this section.
12. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's acceptance.
13. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.
14. Adhered membrane shall not be installed under the following conditions without consulting manufacturer for precautionary steps:
    a. The roof assembly permits interior air to pressurize the membrane underside.
    b. Any exterior wall has 10 percent or more of the surface area comprised of opening doors or windows.
    c. The wall/deck intersection permits air entry into the wall flashing area.
15. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.
16. Roofing and Flashing Trade Contractor shall follow all safety regulations required by OSHA and other AHJ.

3.02 PREPARATION - METAL DECK

A. Install deck sheathing on metal deck:

1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
3. Leave no gaps wider than 1/4 inch in order to provide required continuous support of roof vapor retarder.

3.03 INSTALLATION, GENERAL

A. Perform work in accordance with manufacturer's instructions, NRCA (RM), and NRCA (WM) applicable requirements.

B. Do not apply roofing membrane during cold or wet weather conditions.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Coordinate this work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

3.04 FIRE RESISTANT DECK SHEATHING INSTALLATION

A. Install boards with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together with no joints or gaps greater than 1/4 inch.

1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturer's written instructions and recommended fastening patterns.
2. Install fasteners into the top flange of the metal deck with 3/4 inch penetration through the metal deck. Do not use screws that penetrate the metal deck beyond the bottom flutes.

3.05 INSTALLATION - VAPOR RETARDER AND INSULATION, UNDER MEMBRANE

A. Insulation Installation:

1. General. Install according to membrane roofing system manufacturer’s instructions and recommendations meeting requirements, and as follows:
   a. Install insulation or membrane underlayment over the substrate with boards butted together. Fill joints or gaps greater than 1/4 inch with manufacturer’s recommended sealant.
   b. Install multiple layers of insulation under area of roofing to achieve required thickness.
      1) Cut and fit insulation within 1/4 inch (6mm) of nailers, projections, and penetrations.

B. Attachment of Insulation: Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions. Use mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation at intervals to resist uplift pressure at corners, perimeter, and field of roof.
2. Install fasteners into the top flange of the metal deck with 3/4 inch penetration through the metal deck. Do not use screws that penetrate the metal deck beyond the bottom flutes.

C. Cover Boards: Mechanically fasten cover boards in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.

D. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

E. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.

F. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

G. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches.
   1. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
H. Coordinate depth of roof insulation system installation with wood blocking work provided under Section 06 10 00 - Rough Carpentry.
   1. Preservative treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on Drawings.
   2. Height of nailers shall be matched to that of the insulation thickness being used.
I. Do not install more insulation than can be covered with membrane in same day.

3.06 INSTALLATION - MEMBRANE

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
B. Shingle joints on sloped substrate in direction of drainage.
C. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
D. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
   2. Fully adhere flexible flashing over membrane and up to nailing strips.
   3. Secure flashing to nailing strips at 4 inches on center.
   4. Insert flashing into reglets and secure.
E. Around roof penetrations, seal flanges and flashings with flexible flashing.
F. Install roofing expansion joints where indicated on plans and where required for full System Warranty. Make joints watertight.
   1. Install prefabricated joint components in accordance with manufacturer's instructions.
G. Coordinate installation of roof drains and sumps and related flashings.

3.07 FLASHING

A. Flashing of parapets, curbs, expansion joints and other parts of the roof shall be performed using reinforced TPO membrane. Non-reinforced TPO membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded accessories is not feasible.
B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.08 WALK PADS

A. Install walkway pads at all traffic concentration points (such as roof hatches, access doors, rooftop ladders) and all locations as identified by the Drawing.

3.09 DAILY SEAL

A. When the completion of flashings and terminations is not achieved by the end of the workday, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
B. Complete terminations and base flashings, providing temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
C. Use manufacturer’s recommended adhesive or other equal material in accordance with the manufacturer's requirements.

3.10 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Owner will provide testing services, and Construction Manager to provide temporary construction and materials for testing in accordance with requirements.

C. Require site attendance of roofing and insulation material manufacturers at frequency and intervals required per system warranties. Arrange for visits suitable to observe application of system components and to meet requirements for manufacturer's warranty, but at a minimum of not less than one inspection during installation and one inspection following completion of roofing installation. Submit manufacturer's written record of inspection and observation.
   1. Manufacturer's field report shall specifically include inspection of roofing membrane seams, and indicate acceptance or identify locations and repair instructions where completed work is deemed unacceptable.

D. Roofing Trade Contractor shall perform testing of roof membrane seam welds. Perform no less than two tests daily when roofing is being applied, but not less than one test each time the heat welding machine is turned on. Submit written test results in log form, recording each time machine is powered on, weather conditions, temperature, and other conditions that may affect installation.

E. Testing agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
   1. Testing will include flood testing and infrared thermography of the membrane surface. Infrared scans may reveal areas of suspected water damage to insulation materials.
      a. The Roofing and Flashing Trade Contractor shall cooperate fully during testing, and perform test cuts of roof surface to make insulation available for inspection and moisture testing.
      b. Insulation found, in the opinion of the Architect, to be damaged by moisture shall be removed and replaced at no cost to the Owner. The extent of replacement shall be at the discretion of the Architect and/or Owner.
   2. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or repaired work with specified requirements.

F. Remove, repair and reinstall or restore-in-place damaged items.
   1. Replace damaged materials or items with new if repair not acceptable to Architect.
   2. Wet insulation materials shall be replaced.

G. Manufacturer Services per Section 01 40 00 - Quality Requirements, and as follows: Roof membrane system manufacturer’s field representative(s) shall give product use recommendations and perform site visits to inspect product installation in accordance with instructions and warranty requirements.
   1. Final Roof Inspection: Manufacturer to perform a warranty inspection of the roofing certifying a proper installation and upon completion, submit a copy of the report to the Architect.

3.11 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
   1. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials.
   2. All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.

B. Clean roof area before beginning work and at the end of each workday. Prior to laying roofing membrane perform a close check to ensure no sharp objects are present on the substrate.

3.12 PROTECTION

A. Protect installed roofing and flashings from construction operations until date of Final Completion, or Owner occupancy (whichever occurs first)..

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this Section shall be included in the Roofing Flashing and Sheet Metal Trade Bid. Refer to Section 07 00 02 - Roofing and Flashing Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following fabricated sheet metal items, including:
   1. Prefinished metal flashings and counterflashings.
   2. Prefinished and galvanized metal copings and fascia.
   3. Fabricated prefinished metal roof scuppers.
   4. Prefinished metal collection boxes and downspouts.
   5. Prefinished metal gutters.
   6. Underlayment Barrier to separate sheet metal products from preservative pressure treated wood.
   7. Reglets and accessories required for a complete installation.
   8. Through wall flashing above and adjacent to roofs.

B. Work furnished by this Section, for installation by other sections includes the following:
   1. Through-wall flashings for installation in Masonry construction for low roofs meeting high walls shall be furnished by this section to the Masonry Trade Contractor for installation within the masonry work. Snap-in counterflashings that get joined to and sealed to the through-wall flashing shall be furnished and installed by the roofing subcontractor.
   2. Through-wall flashings for installation in other than masonry construction for low roofs meeting high walls shall be furnished by this Section to the Construction Manager for installation within the wall construction. Snap-in counterflashings that get joined to and sealed to the through-wall flashing shall be furnished and installed by the roofing subcontractor.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association: www.aamanet.org.
B. ANSI. American National Standards Institute; www.ansi.org.
C. ASTM. American Society for Testing and Materials; www.astm.org.
D. CDA. Copper Development Associated, Inc.
E. SMACNA. Sheet Metal and Air Conditioning Contractors' National Association: www.smacna.org.
F. SPRI. Single Ply Roofing Industry; www.spri.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

D. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems.
E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
F. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
G. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
H. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
I. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
J. CDA A4050 - Copper in Architecture - Handbook.
K. SMACNA (ASMM) - Architectural Sheet Metal Manual.
L. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination, and as follows:
   1. Coordinate with installation of associated counterflashings installed under other sections.
B. Sequencing and Scheduling per Section 01 32 16 - Construction Progress Schedule.
C. Preinstallation Meeting per Section 01 70 00 - Execution and Closeout Requirements, and as follows:
   1. Convene one week before starting work of this section. Require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.
      a. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Subcontractor's written acceptance of substrate conditions. Submit prior to commencing work of this section.
   2. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details. Details shall meet roofing system manufacturer requirements for stated warranty.
      a. Include project specific details for actual project conditions and configurations showing adjacent materials - manufacturer standard details will not be accepted.
   3. Details of roof edge securement complying with code, and certification that roof edge securement meets the ANSI/SPRI/FM 4435/ES-1 standard required by code.
   4. Samples: Submit two samples, 8 by 8 inches in size, illustrating metal finish color.
   5. Fabricator and installer qualifications.
   6. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Roofing and Flashing Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
B. Provide roof edge fastenings capable of meeting wind and uplift requirements of building code as part of metal roof edge coping systems.
C. Maintain one copy of each document on site.
D. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of experience.
E. See Section 01 91 19 - Building Envelope Commissioning for requirements association with building envelope commissioning applicable to this section.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, and Section 01 60 00 - Product Requirements.
B. Protect materials during shipping, handling, storage, and installation from exposure to weather, water, scratches, and other damage.
C. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
D. Prevent contact with materials that could cause discoloration or staining.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide finish warranty for all prefinished sheet metal work, guaranteeing the finish against fading, cracking, peeling, or delamination for a period of 20 years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Stainless Steel: ASTM A666/A666M, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch thick; smooth satin finish.

2.02 PREFINISHED ALUMINUM SHEETS

A. Aluminum Sheet Substrates: ASTM B209/B209M, alloy and temper as recommended by manufacturer for application, plain finish shop pre-coated with fluoropolymer coating.
1. Superior Performance Organic Coating System: Comply with AAMA 2605 for aluminum preparation, pretreatment, primer and multiple coat finish coat system; provide thermally cured 70-percent PVDF fluoropolymer systems; with chrome conversion pre-treatment.

a. Color: As selected by Architect from manufacturer's full range of standard and custom colors.

2. Base Metal Thickness: 18 gage, 0.040 inch, minimum.

2.03 PREPAINTED, METALLIC-COATED STEEL SHEETS

A. Metallic-Coated Steel Sheet Substrates:

1. Pre-Finished Galvalume Steel: ASTM A653/A653M, with G90/Z275 zinc coating; shop pre-coated with PVDF coating.
2. Superior Performance Organic Coating System: Provide thermally cured 70-percent PVDF fluoropolymer systems in accordance with AAMA 2605, with chrome conversion pre-treatment.
3. Base Metal Thickness: 24 gauge, 0.024 inch, minimum.
4. Color: As selected by Architect from manufacturer's full range of standard and custom colors.

2.04 PRE-MANUFACTURED ROOF EDGE FLASHINGS AND COPINGS

A. Roof Edge Flashings and Copings Manufacturer's: Subject to Roof System Manufacturer's approval and required compliance with roof system warranty:

1. Architectural Products Co: www.archprod.com.
2. W.P. Hickman Company: www.wph.com.
3. Metal-Era Inc: www.matalera.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.05 COMPONENTS

A. Roof Edge Flashings: Factory Fabricated to sizes required; mitered, welded corners; concealed fasteners

1. Configuration: Fascia, cant, and edge securement for roof membrane
2. Pull off Resistance: Tested in accordance with SPRI ES-1 RE-1 and RE-2 to positive and negative design wind pressure as defined by SPRI ES-1.
3. Material: Extruded aluminum in termination/receiver, in thickness as determined by manufacturer to maintain the specified system warranty, with prefinished aluminum or galvalume formed snap-on fascia.
4. Finish: 70 percent polyvinylidene fluoride.
5. Color: to be selected by Architect from manufacturer's custom range.

B. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.

1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
2. Pull Off Resistance: Tested in accordance with SPRI ES-1 RE-3 to positive and negative design wind pressure as defined by SPRI ES-1.
3. Material: Formed aluminum sheet, 0.050 inch thick, minimum.
4. Finish: 70 percent polyvinylidene fluoride.
5. Color: To be selected by Architect from manufacturer's full standard and custom range.
6. Galvanized coping at galvanized metal wall panel systems.

C. Scuppers:

1. Pull Off Resistance: Tested in accordance with SPRI ES-1 RE-3 to positive and negative design wind pressure as defined by SPRI ES-1.
2. Material: Formed aluminum sheet, 0.050 inch thick, minimum.
3. Color: To be selected by Architect from manufacturer's custom range.

4. Finish: 70 percent polyvinylidene fluoride.

2.06 SNAP - IN FLASHING

A. Springlock Reglet and Flashing: Where indicated on Drawings, provide surface-mounted reglet or set into masonry joints depending on project conditions. Both types shall be for use in masonry. Reglet and flashing shall be made of Type 304 stainless steel (.020 inch). Reglet shall have a 1 inch factory formed end lap; flashing shall have a 3 inch end lap.

B. Reglet and flashing system shall be certified by the manufacturer to resist 110 MPH wind loads for a minimum of two continuous hours as verified by independent test results

C. Reglet to be installed level with the top of the reglet at least 7 inches above the high point of cant strip

D. Surface mounted flashing shall be supplied with special washers (7/8 inch diameter stainless steel with neoprene facing) to seal stainless steel drive pin penetrations

2.07 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, minimum 2 inches wide, interlocking with sheet.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Form material with lap and backer plate seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

1. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25mm) deep, filled with elastomeric or butyl sealant concealed within joints.

F. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.08 THROUGH WALL FLASHING AT ROOFS

A. Stainless Steel Flashing and Drip Edges: ASTM A666/A666M, Type 304, soft temper; 26 gage (0.45mm) thick; finish 2B to 2D. Shop fabricated or factory formed to profiles and sizes indicated.

1. Include integral hemmed drip edge at face of masonry veneer, including shapes to fit lipped brick conditions indicated.
2. Provide shop or factory formed interior and exterior corner shapes, end dams, and other transition shapes to fit project conditions. All such shapes shall feature continuously welded or soldered water-tight joints. Adhesive and sealant joints and site-formed lapped corners are not permitted.
3. Flashing Termination: Plastic or stainless steel construction, profiled to accept sealing mastic along top edge or continuous fully adhered flashing termination strip compatible with VR/AIB.

2.09 GUTTERS AND DOWNSPOUTS

A. Gutters: SMACNA (ASMM) Rectangular profile.

B. Downspouts: Rectangular profile.

C. Gutters and Downspouts: Sizes indicated.

D. Accessories: Profiled to suit gutters and downspouts.

1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements. Fasteners shall be stainless steel for fastening into pressure treated lumber.
2. Gutter Supports: Brackets.
   a. Brackets shall be fabricated of 1/8 inch thick galvanized steel finish wrapped with prefinished PVDF coated galvalume sheet steel coil stock to match gutter, and include

matching concealed straps across top of gutter. Coil stock to wrap all sides of bracket, including surface in contact with gutter.

3. Downspout Supports: Brackets.

E. Splash Pads: 24 inch by 24 inch splash pad to be provided at the base of each downspout on lower roof areas. Splash pads shall be of same material as walkway pads specified in Section 07 54 00 - Thermoplastic Membrane Roofing,

F. Downspout Boots: Steel, made of same material as metal fascia, formed to make transition from rectangular gutter to round drainage pipe at grade as indicated in drawings.

G. Seal metal joints.

H. Gutter guards: Expanded or perforated metal mesh of same type as gutter, designed to permit entry of water into gutter while preventing accumulation of leaf and other debris in gutter. Guard shall feature not less than 50 percent free area at top surface of gutter, and shall be snap-in type or secured to gutter.

I. Color to match adjacent wall panel system.

2.10 ACCESSORIES

A. Metal Accessories: Provide cleats, straps, hangers, anchoring devices, and similar accessory units required for a complete installation of work, noncorrosive, size and gage required for performance.

B. Underlayment: ASTM D226/D226M, organic roofing felt, Type I, No. 15.

C. Self-adhering vapor retarder / air barrier; same material as selected for membrane roofing system. Formulation for high temperature resistance.

D. Primer Type: Zinc chromate.

E. Sealants: as specified in Section 07 92 00 - Joint Sealants .

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:

1. Carefully examine installation areas with Fabricator and Installer present, for compliance with requirements affecting work performance.
    a. Verify that field measurements, surfaces, substrates, structural support, utility penetrations, tolerances, slope, cleanliness and other conditions are per manufacturer requirements, and ready to receive work.
    b. Verify that substrate system is even, smooth, sound, clean, dry, and free from defects.
    c. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
    d. Verify roofing termination and base flashings are in place, sealed, and secure.
    e. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Submit written acceptance of substrate conditions prior to commencing work of this section.

3.02 INSTALLATION

A. General: Install Sheet Metal Flashing and Trim according to the Drawings, approved submittals, manufacturer's instructions, SMACNA (ASMM), and as follows:

1. Counterflashings: SMACNA (ASMM), Detail 4-4C.
2. Roof Penetration Flashing: SMACNA (ASMM), Detail 4-14B.

B. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.

C. Provide an underlayment barrier between metal surfaces of units in contact with dissimilar metals, and between metal and pressure treated wood.

D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
E. Seal metal joints watertight.
F. Install expansion joints at frequency recommended by SMACNA (ASMM). Do not fasten moving seams such that movement is restricted.
G. Coordinate with installation of roofing system and roof accessories.
H. Secure gutters and downspouts in place with concealed fasteners.
I. Install continuous gutter guards at all gutters.
J. Connect downspouts to downspout boots, and grout connection watertight.
K. Fabricate, support and anchor flashing work to withstand thermal expansion stresses and full loading by water or ice, without damage, deterioration or leakage.
L. Counterflash mechanical and electrical items projecting through roofing, unless otherwise shown.
M. No exposed face penetrations or perforation shall be made in metal panels by fasteners without Architect's specific approval.

3.03 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Remove protective film (if any) from exposed surfaces of sheet metal promptly upon installation. Strip with care to avoid damage to finishes.
C. Clean exposed sheet metal surfaces, removing substances that might cause abnormal discoloration of metal.
D. Upon completion of each area of soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with baking soda solution, and then flushing clear water rinse. Use special care to neutralize and clean crevices.
E. Clean exposed metal surfaces of substances that would interfere with uniform oxidation and weathering.

3.04 SCHEDULE

A. Counterflashings at Roofing Terminations (over roofing base flashings): Stainless steel.
B. Fascia Flashing over Gutters and at Roof Perimeter: Prefinished PVDF on galvalume on sheet steel.
C. Roofing Penetration Flashings, for Pipes, Structural Steel, and Equipment Supports: Thermoplastic type to match roof membrane.

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 TRADE CONTRACT REQUIRED

A. The work of this section shall be included in the Roofing Flashing and Sheet Metal Trade Contract. See Section 07 00 02 - Roofing and Flashing Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Furnishing, delivering, erecting, and installing the following work:
   1. Roof curbs.
   2. Ladder safety post.
   3. Anchor fall protection.
   4. Elevator Hoistway Vent.
   5. Manufactured roofgard railing system at roof edges.
   6. Accessories required for a complete installation.

1.03 ABBREVIATIONS AND ACCRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.
B. ASSP. American Society of Safety Professionals; www.assp.org.
C. OSHA. Occupational Safety and Health Administration; www.osha.gov.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ANSI / ASSP Z359.7 - Qualification and Verification Testing of Fall Protection Products.
C. ANSI/ASSP A10.32 - Personal Fall Protection Used in Construction and Demolition Operations.
D. ANSI/ASSP Z359.18 - Safety Requirements for Anchorage Connectors for Active Fall Protection Systems.
E. OSHA 1910 - Occupational Safety and Health Standards.
F. OSHA 1910.23 - Walking-Working Surfaces.
G. OSHA 1926 Subpart M - OSHA 1926 Subpart M - Fall Protection.
H. OSHA 1926.500-1926.503 - Fall Protection.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Manufacturer's data sheets on each product to be used.
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Installation methods.
      d. Maintenance requirements.
   2. Certificate: For smoke hatches, provide certificate of approval from authority having jurisdiction.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional

prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Roofing and Flashing Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Environmental Product Declarations (EPD).

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data: Operating, cleaning and maintenance recommendations.
    a. Basic Owner requirements to maintain warranty
    b. Recommended maintenance guidelines and maintenance schedule.
3. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner''s name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company with a minimum of three years experience specializing in work of the type required by this section.
B. Single Source Responsibility: Furnish each type of roof accessory and its accessory materials from one manufacturer for entire project, unless otherwise acceptable to Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store products under cover and elevated above grade.

PART 2 PRODUCTS

2.01 LADDER SAFETY POST

A. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
1. Activar Construction Products; Extendable Series: www.activarcpg.com.
2. Acudor; TSP series: www.acudor.com.
3. BILCO Company; LU-1: www.bilco.com. (Basis of Design)
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Materials:
1. Ladder safety post shall be pre-assembled from the manufacturer.
2. Performance characteristics:
    a. Safety post shall allow operation with one hand.
    b. Tubular post shall lock automatically when fully extended.
    c. Safety post shall have controlled upward and downward movement.
    d. Release lever shall disengage the post to allow it to be returned to its lowered position.
    e. Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14 inches on center and clamp brackets to accommodate ladder rungs up to 1-3/4 inches in diameter.
3. Post shall be manufactured of high strength square steel tubing.

4. Balancing spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, controlled operation when raising and lowering the safety post.
5. Hardware: All mounting hardware shall be Type 316 stainless steel.
6. Locate ladder safety post where indicated on Drawings.
7. Finishes: Factory finish shall be yellow powder coat steel.

2.02 ANCHOR FALL PROTECTION

A. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. Fall Tech; 78012CSWE: www.falltech.com.
   2. French Creek Fall Safety; 1760-12-1525 post anchor: www.fcsafety.com.
   3. GF Protection Inc.; Guardian Fall Protection CB Anchor Series: www.guardianfall.com. (Basis of Design)
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Anchor posts shall extend through roofing, and be compatible with SRL's, vertical lifelines, horizontal lifelines, and shock-absorbing lanyards.

C. Composition: galvanized steel.

D. Post diameter: 2-7/8 inches.

E. Fillet weld: 5/16 inch.

F. Welding shall be by AWS-certified welder, in accordance with applicable welding regulations.

G. Minimum plate size: 12 inches by 12 inches.

H. Minimum breaking strength: 5000 pounds.

I. System shall meet or exceed all applicable OSHA 1926 Subpart M, OSHA 1910, ANSI/ASSP Z359.18, andANSI/ASSP A10.32 standards for fall protection.

J. System shall pass ANSI / ASSP Z359.7.

2.03 MANUFACTURED GUARDRAIL SYSTEMS

A. Roof Edge Non-Penetrating Guardrail System: Provide freestanding pedestrian egress barrier system on roof, including pipe railings, uprights, bases, and fittings.
   1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. BlueWater Manufacturing, Inc.; SafetyRail 2000 Architectural Series; www.bluewater-mfg.com. (Basis of Design)
      b. Diversified Fall Protection - Portable Guardrail System; www.fallprotection.com.
      c. Kee safety Inc. - Kee Guard; 111.keesafety.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. System shall have top and mid rail in accordance with OSHA 1910.23 (a)(2).
   3. Structural Load: 200 pounds, minimum, in any direction to all components in accordance with OSHA 1926.500-1926.503.
   4. Height: 42 inches, minimum.
   5. Railings: 1-5/8 inch outside diameter hot rolled pickled electric weld tubing, free of sharp edges and snag points.
   6. Mounting Bases: Class 30 gray iron material cast with four receiver posts. Provide rubber pads on bottom of bases.

7. Receiver Posts: Shall have a positive locking system into slots that allow rails to be mounted in any direction. Friction locking systems are not allowed. Receiver posts shall have drain holes.
8. Accessories:
    a. Toe Board Brackets: Provide manufacturer's standard brackets and friction knobs.
    b. Step-Rail: Variable height railing enables a continuous run of roof edge protection system when the roof steps up or down.
    c. Raised Mid-Rail: Railing to fit over duct work for continuous run of roof edge protection system.
    d. LP Outrigger: Supports place under ductwork or conduit to continue run of roof edge protection system when rail section cannot be used.
    e. Finishing Rail: D-shaped railing extension for ladder landings, length of rail section and D-loop as indicated on drawings.
9. Hardware: Securing pins shall be 1010 carbon steel, zinc plated and yellow chromate dipped. Pins shall consist of collared pin and lanyard that connects to lynch pin.

2.04 ELEVATOR HOISTWAY VENT:

A. Basis-of-Design Manufacturer / Product: Greenheck, Model PEV 400 with ESJ-401 Stationary Blade Louver Penthouse with SMD-201, Class 1 Leakage and Honeywell MS4120F1006 120V, Fail Open, or an Architect acceptable equivalent subject to compliance with requirements from one of the following manufacturers:
    1. McDermott Metal Works; Louvered Penthouse M445PH: www.mcdermottmetalworks.com.
    2. Carnes Company, Product Model PEAB; www.carnes.com.
    3. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Louvered penthouse assemblies with automatic dampers, complying with the following:
    1. Dampers: Horizontally-mounted inside penthouse assembly at roof opening.
    2. Damper Controls: 120 volt, continuously energized to hold damper in closed position, opening when de-energized. Connection to fire alarm system and electrical power source by Electrical Trade Contractor.
    3. Indicator Switch: Open or closed indicator switch for use on low-voltage control circuit connected to fire alarm system by the Section 26 00 01 - Electrical Trade Contractor.
    4. Louver Frame: Alloy 6063-T5 extruded aluminum, 0.081 inch thickness, 4 inches deep, shop welded at mitered corners.
    5. Louver Blades: Alloy 6063-T5 extruded aluminum, 0.081 inch thickness, J profile, positioned at 37/45 degrees on 4-1/2 inch centers.
    6. Hood and Corner Trim: Formed aluminum, 0.100 inch thick with 1 inch fiberglass insulation.
    7. Curb: 12 gage formed galvannealed metal with corrosion-resistant coating and 1 inch fiberglass insulation.
    8. Damper Tray: 18 gage formed galvannealed metal with corrosion-resistant coating.
    9. Bird Screens: Flattened expanded aluminum, 0.05 inch thick with 3/4 inch openings.
    10. Glazed Panels: 1/8 inch thick annealed glass.
    11. Size: 3 foot curb height, plus 1 foot 6 inch penthouse height, with 2 foot 6 inch inside throat dimension of penthouse.
    12. Minimum net free venting area: 3 square feet.
    13. Finish: Manufacturer’s standard mill finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Clean installed work to like-new condition.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 07 81 00
APPLIED FIRE PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing, delivering, and installing the following work:
   1. Applied fire protection of interior structural steel not exposed to damage or moisture.
   2. Applied fire protection of structural steel exposed to damage or moisture.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.
B. CDPH. California Department of Health; www.cdph.ca.gov.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
C. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
D. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
E. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.
F. ASTM E761/E761M - Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.
G. ASTM E859/E859M - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.
H. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
I. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with placement of ceiling hanger tabs, mechanical component hangers, and electrical components.
   1. Coordinate with sequence and placement of ceiling hanger tabs, mechanical component hangers, and electrical components.
      a. The installation of piping, ducts, conduit or other suspended equipment shall not commence until the application of applied fireproofing is complete in that area.
B. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
B. Construction Submittals
   1. Product Data: Provide data indicating product characteristics, performance criteria, and limitations of use.
   2. Manufacturer's Certificate: Certify that applied fireproofing products meet or exceed requirements of Contract Documents.
   3. Test Reports: Reports from reputable independent testing agencies for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, as follows:

a. Bond strength.
b. Bond impact.
c. Compressive strength.
d. Fire tests using substrate materials similar those on project.

4. Asbestos: Manufacturer shall provide Certification that products supplied are 100 percent asbestos free.
5. Field Reports: Indicate environmental conditions that applied fireproofing materials were installed.
6. Installer's Qualification Statement.
7. Specimen warranty.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
a. Include documentation of:
1) Health Product Declarations (HPD).
2) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data:
a. Basic Owner requirements to maintain warranty.
3. Warranty: Executed in Owner's name and filed with manufacturer.

1.06 QUALITY ASSURANCE

A. Regulatory Agency Approvals: Comply with UL or other nationally recognized independent testing agency test for design and construction of fire resistance system.
1. Intumescent fire resistive material shall be manufactured under the Follow-Up Service program of UL and bear the UL label (mark).

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience. and approved by manufacturer

C. Single Source Responsibility: Obtain primary spray applied fireproofing materials from a single source.

1.07 MOCK-UP

A. Construct mock-up, 40 square feet in size.

B. Comply with project requirements for fire ratings.

C. Locate where directed.

D. Examine installation within one hour of application to determine variances from specified requirements due to shrinkage, temperature, and humidity.

E. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary; remove materials and re-construct mock-up.

F. Mock-up may remain as part of the work.

1.08 FIELD CONDITIONS

A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F or when temperature is predicted to be below said temperature for 24 hours after application.

B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.

C. Provide temporary enclosure to prevent spray from contaminating air.

D. Do not allow roof traffic during installation of roof fireproofing and drying period.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a two year period after Date of Substantial Completion.

1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Applied Fire Protection: Subject to compliance with these specifications, provide products of one of the following:

1. GCP Applied Technologies: www.gcpat.com.
2. Isolatek International Corp: www.isolatek.com.
3. Southwest Fireproofing Products Company: www.sfrm.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 FIREPROOFING ASSEMBLIES

A. Contractor to provide assemblies providing required fire resistance to fit conditions, based on products specified.

2.03 MATERIALS

A. Sprayed Fire-Resistive Material interior exposed applications subject to impact or abuse and limited exposure exterior applications (SFRM Type 1): Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:

1. Composition: Non-asbestos, portland-cement-based, not mineral fiber-based.
2. Bond Strength: 150 pounds per square foot, minimum, when tested in accordance with ASTM E736/E736M when set and dry.
3. Dry Density: 21 lb/cu ft, minimum, when tested in accordance with ASTM E605/E605M.
4. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
5. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
6. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
7. Surface Burning Characteristics: Maximum flame spread index of 10 and maximum smoke developed index of 10, when tested in accordance with ASTM E84.
8. Basis of Design Product:
   a. Isolatek International; CAFCO 400: www.isolatek.com.

b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Sprayed Fire-Resistive Material interior concealed applications (SFRM Type 2): Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
   1. Dry Density: 21 lb/cu ft, minimum, when tested in accordance with ASTM E605/E605M.
   2. Compressive Strength: When tested in accordance with ASTM E761/E761M, the material shall not deform more than 10 percent when subjected to a crushing force of 7,344 psf (351 kPa).
   3. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
   4. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
   5. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
   6. Surface Burning Characteristics: Maximum flame spread index of 10 and maximum smoke developed index of 10, when tested in accordance with ASTM E84.
   7. Basis of Design Product:
      a. Isolatek International; CAFCO Blaze-Shield HP: www.isolatek.com.
      b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.04 ACCESSORIES

A. Primer Adhesive: Of type recommended by applied fire protection manufacturer.

B. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive fireproofing. Repair existing fireproofing using same method as original installation or trowel installation techniques recommended by manufacturer.

B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.

C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.

D. Verify that voids and cracks in substrate have been filled.

E. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.02 PREPARATION

A. Perform tests as recommended by fireproofing manufacturer in applications where adhesion of fireproofing to substrate is in question.

B. Remove incompatible materials that could effect bond by scraping, brushing, scrubbing, or sandblasting.

C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.

D. Apply fireproofing manufacturer's recommended bonding agent on primed steel.

E. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.

F. Close off and seal duct work in areas where fireproofing is being applied.

3.03 APPLICATION

A. Preinstallation Meetings: See Section 01 70 00 - Execution and Closeout Requirements.

B. Install metal lath over structural members as indicated or as required by UL Assembly Design Numbers.

C. Apply primer adhesive in accordance with manufacturer's instructions.

D. Apply fireproofing in uniform thickness and density as necessary to achieve required ratings.

E. In exposed locations, trowel surface smooth and form square edges, using tools and procedures recommended by fireproofing manufacturer.

F. Apply overcoat sealer where SFRM is exposed in the finished construction and indicated to be painted.

G. Patching, repairing and cleaning of fireproofing, due to damage done by others, shall be performed by the fireproofing applicator.

H. After completion of fireproofing, fireproofing applicator shall remove equipment, and broom sweep floor areas of overspray materials.

I. Application of fireproofing shall not commence until the project is at a stage to allow the Installer / Applicator to apply product continuously and efficiently, without undue interference and delay by other trades.

J. Coordinate application of sprayed fireproofing with related work to comply with the following requirements:

1. Prior to application of fireproofing, clips, hangers, support sleeves and attachments required to penetrate fireproofing shall be in place.
2. Ducts, piping and other items that would interfere with the application of fireproofing shall not be installed, until application is completed.
3. Prior to application of fireproofing to the underside of steel decking, concrete work above shall be complete.
4. On roof decks without a concrete cover, complete roofing applications and roof mounted equipment installation prior to application of fireproofing to the underside of roof decking and supporting beams and joists.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 40 00 - Quality Requirements.

B. Inspect installed fireproofing after application and curing for integrity, prior to its concealment.

C. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings and requirements of authorities having jurisdiction (AHJ).

D. Re-inspect installed fireproofing for integrity of fire protection, after installation of subsequent Work.

3.05 CLEANING

A. Remove excess material, overspray, droppings, and debris.

B. Remove fireproofing from materials and surfaces not required to be fireproofed.

C. At exposed fireproofing, clean surfaces that have become soiled or stained, using manufacturer's recommended procedures.

END OF SECTION

SECTION 07 81 23
INTUMESCENT FIRE PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish, deliver, and install the following intumescent fire protection work:
   1. Compressible-rod intumescent fire protection.
   2. Protective and/or decorative topcoats.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.
B. CDPH. California Department of Health; www.cdph.ca.gov.
C. FM. Factory Mutual; www.fmapprovals.com.
D. SSPC. The Society for Protective Coatings; www.sspc.org.
E. UL. Underwriters Laboratories; www.ul.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
D. FM (AG) - FM Approval Guide.
E. SSPC-PA 2 - Procedure for Determining Conformance to Dry Coating Thickness Requirements.
F. UL (FRD) - Fire Resistance Directory.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
B. Construction Submittals
   1. Product Data: Manufacturer's data sheets on each product to be used, including:
      a. Performance characteristics and test results.
      b. Preparation instructions and recommendations.
      c. Storage and handling requirements and recommendations.
      d. Installation methods.
   2. Selection Samples: For decorative top coat, color chips representing manufacturer's full range of available colors and sheens.
   3. Verification Samples: For each thickness, color, sheen, and finish required, submit samples not less than 4 inches square on designated substrate illustrating finished appearance.
   4. Test Reports: Published fire resistive designs for structural elements of the types required for the project, indicating hourly ratings of each assembly.
   5. Field Quality Control Submittals: Submit field test report.
   6. Installer's qualification statement.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Health Product Declarations (HPD).
        2) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data:
    a. Basic Owner requirements to maintain warranty
3. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Provide a mock-up for evaluation of surface preparation techniques and application workmanship; approved mock-up will serve as a standard of comparison for subsequent work of this section.
C. Finish at least 4 sq ft of surface in areas as designated by Architect.
D. Evaluate mock-up for compliance with specified requirements, including thickness and finish texture.
E. Do not proceed with remaining work until mock-up is approved by Architect.
F. Approved mock-up may remain as part of the project.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
B. Deliver materials in manufacturer’s original, unopened containers with identification labels and testing agency markings intact and legible.
C. Store products in manufacturer's unopened packaging until ready for installation.
1. Store at temperatures not less than 50 degrees F in dry, protected area.
2. Protect from freezing, and do not store in direct sunlight.
3. Dispose of any materials that have come into contact with contaminants of any kind prior to application.
D. Dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 FIELD CONDITIONS

A. Protect areas of application from windblown dust and rain.
B. Maintain ambient field conditions, such as temperature, humidity, and ventilation, within limits recommended by manufacturer for optimum results. Do not install products under ambient conditions outside manufacturer's absolute limits.
1. Provide temporary enclosures as required to control ambient conditions.
2. Do not apply intumescent fireproofing when ambient temperatures are below 50 degrees F without specific approval from manufacturer.

3. Ensure that relative humidity is between 40 and 60 percent in areas of application.
4. Provide ventilation in enclosed spaces during application and for not less than 72 hours afterward.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Intumescent Thin-Film Fire Protection for Metal: Subject to compliance with these specifications, provide products of one of the following:
   1. Albi Protective Coatings, a subsidiary of StanChem Polymers: www.albi.com.
   2. Carboline Company; A/D Firefilm III: www.carboline.com.
   3. Contego International, Inc; Contego High Solids Reactive Fire Barrier (HS RFB) Intumescent : www.contegointernational.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Intumescent Fire Protection Top Coating for Wood: Subject to compliance with these specifications, provide products of one of the following:
   1. Albi Protective Coatings, a subsidiary of StanChem Polymers: www.albi.com.
   2. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 SYSTEM REQUIREMENTS

A. Fireproofing: Provide intumescent thin-film, compressible-rod, and gasket fire protection systems tested by an independent testing agency in accordance with ASTM E119 and acceptable to authorities having jurisdiction (AHJ).
   1. Provide assemblies listed by FM (AG) or UL (FRD) and bearing listing agency label or mark.

2.03 MATERIALS

A. Fire Resistive Compressible-Rod System: Compressible intumescent fire protection system for structural steel, gypsum board, wood, oriented strand board (OSB), concrete, and concrete masonry units (CMU).

B. Protective and Decorative Top Coating: As recommended by fireproofing manufacturer for exposure and substrate conditions.
   1. Coordinate with paint for color and sheen to match between steel coated with intumescent coating and adjacent painted surfaces; see Sections 09 91 13 - Exterior Painting and 09 91 23 - Interior Painting.

C. Sealers and Primer: As required by tested and listed assemblies, and recommended by fireproofing manufacturer to suit specific substrate conditions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates to determine if they are in satisfactory condition to receive intumescent fire protection; verify that substrates are clean and free of oil, grease, incompatible primers, or other foreign substances capable of impairing bond to fireproofing system.

B. Do not begin installation until substrates have been properly prepared.

C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Thoroughly clean surfaces to receive fireproofing.

B. Repair substrates to remove surface imperfections that could effect uniformity of texture and thickness of fireproofing system, and remove minor projections and fill voids that could telegraph through finished work.

C. Cover or otherwise protect other work that might be damaged by fallout or overspray of fireproofing system, and provide temporary enclosures as necessary to confine operations and maintain required ambient field conditions.

3.03 APPLICATION

A. Comply with manufacturer's instructions for each particular intumescent fire protection system installation application as indicated.

B. Apply manufacturer’s recommended primer to required coating thickness.

C. Apply fireproofing to full thickness over entire area of each substrate to be protected.

D. Apply coats at manufacturer’s recommended rate to achieve dry film thickness (DFT) as required for fire resistance ratings designated for each condition.

E. Apply intumescent fire protection by spraying to maximum extent possible, and as necessary complete coverage by roller application or other method acceptable to manufacturer.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 40 00 - Quality Requirements.

1. Arrange for testing of installed intumescent fire protection by an independent testing laboratory using magnetic pull-off dry film thickness gauge in accordance with SSPC-PA 2, and ensure it meets requirements of authorities having jurisdiction (AHJ).
2. Submit field test reports promptly to Construction Manager and Architect.

B. Repair or replace intumescent fire protection at locations where test results indicate fireproofing does not meet specified requirements.

3.05 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Immediately after installation of fireproofing in each area, remove overspray and fallout from other surfaces and clean soiled areas.

3.06 PROTECTION

A. Protect installed intumescent fire protection from damage due to subsequent construction activities, so fireproofing is without damage or deterioration before Date of Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following firestopping work:
   1. Firestopping systems.
   2. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.
   3. Details that require firestopping include but are not limited to:
      a. Through penetrations and membrane penetrations of smoke- or fire-resistance rated horizontal assemblies (floors and/or ceiling/roof assemblies) and smoke- or fire-resistance rated wall assemblies (barriers and/or partitions.)
      b. Penetrations through fire-resistance-rated walls and partitions.
      c. Membrane penetrations of fire-resistance-rated walls and partitions.
      d. Sealant joints in fire-resistance-rated construction (floors, walls, and roofs.)
      e. Penetrations for the passage of ducts, cable, cable trays, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
      f. Safing slot gaps between edges of floor slabs and curtain walls.
      g. Openings between structurally separate sections of wall or floors.
      h. Gaps between the tops of walls and ceiling or roof assemblies.
      i. Openings and penetrations in walls containing fire doors.
      j. Openings around structural members penetrating floors or walls.

B. Work specified in this section, to be provided by other trades includes:
   1. Firestopping of through-penetrations for the work of the Fire Protection, Plumbing, HVAC, or Electrical Trade Bid categories shall be performed by the respective Trade Contractor making the penetration. See applicable Trade Contractor category's Trade Contractor Summary section.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.
B. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov.
C. ITS. Intertek Testing Services: www.intertek.com.
D. FM. Factory Mutual Research Corporation: www.fmglobal.com.
E. OTC. Ozone Transportation Commission: www.otcair.org.
F. SCAQMD. South Coast Air Quality Management District: www.aqmd.gov.
G. UL. Underwriters Laboratories: www.ul.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM C1193 - Standard Guide for Use of Joint Sealants.
C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
D. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
E. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
F. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems.

G. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
H. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
I. ITS (DIR) - Directory of Listed Products.
J. OTC Model Rule, AIM - Architectural, Industrial, and Maintenance Coatings.
K. FM (AG) - FM Approval Guide.
L. SCAQMD 1168 - Adhesive and Sealant Applications.
M. UL (BMD) - Building Materials Directory.
N. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.
O. UL (FRD) - Fire Resistance Directory.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Convene one week prior to commencing work of this section.
   1. See Section 01 70 00 - Execution and Closeout Requirements.
B. Sequencing and Scheduling:
   1. See Section 01 32 16 - Construction Progress Schedule.
   2. Coordinate construction of openings and penetrating items to ensure that through-penetration firestopping systems are installed according to specified requirements. Coordinate sequence of work with the work of other trades.
   3. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestopping systems.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Schedule of Firestopping Materials: Submit a schedule of materials, in tabular form, indicating the firestopping system to be utilized for each different firestopping application, identifying the following:
      a. All of the individual materials required for each complete system.
      b. Manufacturer’s product name and nomenclature for each material.
      c. Type and location of each penetration or opening type, by design designation of qualified testing and inspecting agency.
      d. Types of construction assembly penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
   2. Product Data: Provide data on product characteristics, performance ratings, and limitations.
   3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   4. Installer's qualification statement.
   5. Test reports, for assemblies for which none of the substantiation listed in QUALITY ASSURANCE paragraph below exists.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

a. Include documentation of:
1) Health Product Declarations (HPD).
2) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
1. Submit in accordance with the following:
a. Section 01 70 00 - Execution and Closeout Requirements.
b. Section 01 78 00 - Closeout Submittals.

1.06 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Installer Qualifications: Company specializing in performing the work of this section and:
1. Having received and passed all training, licensing and approvals required by the firestopping system manufacturer.
2. Verification of minimum three years documented experience installing work of this type.
3. Verification of at least five satisfactorily completed projects of comparable size and type.

C. Single Source Responsibility: To the greatest extent practical, obtain firestopping materials from a single manufacturer.
1. Materials of different firestopping manufacturers shall not be intermixed in the same firestopping system or opening, if not part of that firestopping system.
2. Tested and listed firestopping systems shall be used before an engineering judgment (EJ) is requested, even if from another manufacturer.

D. Sustainability Standards Certifications:
1. VOC Requirements: Product shall meet LEED requirements for targeted credits, and OTC Model Rule, AIM.

1.07 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Install one firestopping assembly representative of each fire rating design required on project.
1. Where one design may be used for different penetrating items or in different wall, floor, roof, or partition constructions, install one assembly for each different combination.
2. Where firestopping is intended to fill a linear opening, install at least 1 linear foot of firestopping.

C. If accepted, mock-up will represent minimum standard for this work.

D. If accepted, mock-up may remain as part of this work. Remove and replace mock-ups not accepted.

1.08 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers: Subject to requirements of these specifications, and except where otherwise indicated in this section, provide products of one of the following:
   1. 3M Fire Protection Products: www.3m.com/firestop.
   2. A/D Fire Protection Systems Inc: www.adfire.com.
   3. Hilti, Inc: www.hilti.com.
   4. Nelson FireStop Products: www.nelsonfirestop.com.
   5. Owens Corning; ThermaFiber: www.thermafiber.com.
   6. Pecora Corporation: www.pecora.com.
   7. RectorSeal, a CSW Industrials Company: www.rectorseal.com/firestop-solutions.
   8. Specified Technologies Inc: www.stifirestop.com.
   9. USG: www.usg.com.
   10. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 MATERIALS

A. Prohibited Materials: Do not use asbestos-containing or carcinogenic materials.
B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168 and Section 01 81 13 - Sustainable Design Requirements.
C. All materials shall be asbestos-free and non-carcinogenic.
D. Firestopping materials shall contain no flammable or toxic solvents and shall not produce toxic or flammable outgassing during the drying or curing process.
E. Firestopping materials used shall not require solvent base chemicals for clean-up purposes.
F. If required, hazardous disposal of firestopping materials shall be strictly observed as noted on the individual MSDS.
G. Water-based firestopping materials shall be considered preferable over silicone or solvent based materials.
H. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials required for tested firestopping assembly.
I. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Performance Requirements - Provide and install firestopping systems that are produced to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases. Include the following:
   1. Firestop each penetration through rated construction to the approval of the Authority Having Jurisdiction (AHJ).
   2. Provide and install complete firestopping systems that are designed and approved for the specific construction to be firestopped.
   3. Provide and install firestopping materials of thicknesses, widths, and densities required.
B. F-Rated Through-Penetration Firestopping Systems: Provide through-penetration firestopping system with F (flame) ratings indicated, as determined per ASTM E814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
C. T-Rated Through-Penetration Firestopping Systems: Provide firestopping systems with T (temperature) ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in

occupied floor areas. T-rated assemblies are required where firestopping systems are required to protect the following conditions:

1. Penetrations located outside of wall cavities.
2. Penetrations located outside fire-resistive shaft enclosures.
3. Penetrations located in construction containing doors required to have a temperature-rise rating.
4. Penetrating items larger than a 4 inch diameter nominal pipe of 16 square inches in overall cross-sectional area.

D. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per UL 2079 and/or ASTM E119 and ASTM E1966, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.

E. For firestopping exposed to view, traffic, moisture, or physical damage, provide products that do not deteriorate when exposed to these conditions.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide through-penetration firestopping systems with elastomeric qualities.
2. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestopping systems capable of supporting the floor loads involved either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestopping systems not requiring removal of insulation.

2.04 FIRESTOPPING SYSTEMS

A. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant; conforming to the following:

1. Durability and Longevity: Permanent.

B. Foam Firestoppping: Single or multiple component silicone foam compound; conforming to the following:

1. Durability and Longevity: Permanent.
2. Basis of Design Product: Hilti; Two-component polyurethane: www.us.hilti.com.
    a. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers; conforming to the following:

1. Durability and Longevity: Permanent.
2. Basis of Design Product: National Gypsum Company; PROFORM® brand FIRE-SHIELD 90 COMPOUND Fire and Smoke Stop: www nationalgypsum.com.
    a. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

D. Fiber Firestopping: Mineral fiber insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to the following:

1. Durability and Longevity: Permanent.
2. Manufacturers: Subject to compliance with requirements of these specifications, provide products of one of the following:
    a. A/D Fire Protection Systems Inc: www.adfire.com.
    b. Roxul Inc: www.roxul.com.
    c. Thermafiber, Inc: www.thermafiber.com.

d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

E. Firestopping Devices - Wraps and Collars: Mechanical device with incombustible filler and sheet stainless steel jacket, intended to be installed after penetrating item has been installed; conforming to the following:
   1. Durability and Longevity: Permanent; suitable for pedestrian traffic.

F. Intumescent Putty: Compound that expands on exposure to surface heat gain; conforming to the following:
   1. Durability and Longevity: Permanent.

PART 3 EXECUTION

3.01 EXAMINATION

A. See Section 01 40 00 - Quality Requirements.

B. Carefully examine installation areas with installer/applicator present, for compliance with requirements affecting work performance.

C. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Comply with manufacturers written installation instructions for preparing substrates.

B. Clean substrate surfaces of all frost, dirt, dust, grease, oil, oxidation, loose material, surfaces particles, or other materials that could adversely affect bond of firestopping material.

C. Remove incompatible materials that could adversely affect bond.

D. Install backing materials to prevent liquid material from leaking.

E. Coordinate with fire protection, plumbing, mechanical, electrical, and other trades to assure that all pipe, conduit, cable, and other items that penetrate fire-rated construction have been permanently installed prior to installation of firestopping and smoke seals.

3.03 INSTALLATION / APPLICATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Regulatory Requirements: Install firestopping materials in accordance with published Through-Penetration Firestop Systems in UL (BMD) or the publication of another approved independent laboratory.

C. Comply with manufacturer’s instructions for installation of firestopping materials.

D. Seal all joints to ensure an air and water resistant seal, capable of withstanding compression and extension due to thermal, wind or seismic joint movement.

E. Notify Construction Manager prior to installation of firestopping systems that might hamper the performance of fire dampers.

F. Installing Penetration Firestopping Systems:
   1. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestopping systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestopping systems.

G. Installing Firestopping Joint Systems:
   1. General: Comply with the “System Performance Requirements” article in Part 1, with ASTM C1193, and with the sealant manufacturer’s installation instruction and drawings pertaining to products and applications indicated.

2. Install joint fillers to provide support of sealants and/or materials during application and at the position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.
3. Install systems by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint width that optimum sealant movement capability.
4. Tool non-sag sealants immediately after application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

H. Do not cover installed firestopping until inspected by Independent Testing Agency.

I. Install labeling required by code: Identify firestopping systems with permanently attached code-compliant preprinted metal or plastic labels.

3.04 FIELD QUALITY CONTROL

A. Independent Testing Agency: In accordance with requirements of the Authority Having Jurisdiction (AHJ), inspection of installed firestopping systems shall be provided by a third-party inspector on behalf of the Owner and the AHJ.

B. In accordance with Section 01 40 00 - Quality Requirements the subcontractor shall:
1. Anticipate inspections, provide access to facilitate inspections, and cooperate fully with third-party inspector.
2. Repair, modify, and replace installed firestopping materials determined by the third-party inspector to be unacceptable, to the extent necessary to obtain inspector's approval of the installation.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

A. Protect adjacent surfaces from damage by material installation. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 91 00
PREFORMED JOINT SEALS

PART 1 GENERAL

1.01 TRADE CONTRACT REQUIRED

A. The work of this Section shall be included in the Waterproofing, Dampproofing, and Caulking Trade Bid. Refer to Section 07 00 01 - Waterproofing, Dampproofing, and Caulking Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following preformed joint seals work:
   1. Precompressed foam seals.

B. Sealants being furnished and installed by other trades include the following:
   1. Section 04 00 01 - Masonry Trade Contract: preformed joint seals within wall flashing assemblies required to facilitate the installation of the work.
   2. Section 07 00 02 - Roofing and Flashing Trade Contract: preformed joint seals within sheet metal roofing, shingle roofing, single ply membrane roofing, and sheet metal flashings required to facilitate the installation of roofing products.
   3. Section 08 00 01 - Metal Windows Trade Contract: Preformed joint seals at perimeter of window, curtainwall, and storefront assemblies installed simultaneously with the frames.
   4. Section 08 00 02 - Glazing Trade Contract: Preformed joint seals used to install glazing panels within openings.
   5. Section 23 00 01 - HVAC Trade Contract: Preformed joint seals used for installation of ductwork and mechanical items.
   6. Division 32 Exterior Improvements: Preformed joint seals indicated in Civil and Landscape drawings shall be provided by the Division 32 subcontractor(s).
   7. Other preformed joint seals specifically identified on drawings as belonging to specific sections.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.

B. UL. Underwriters Laboratories; www.ul.com.

1.04 REFERENCE STANDARDS

A. Editions of listed standards shall be as referenced by applicable codes, or most current edition if not referenced.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

D. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with other sections referencing this section.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Manufacturer's technical data sheets for each product, including chemical composition, movement capability, color availability, limitations on application, and installation instructions.
   2. Samples for Color Selection: 4 inch long pieces of each color available; at least two samples of each color.

3. Installer's Qualification Statement.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Waterproofing, Dampproofing, and Caulking Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Environmental Product Declarations (EPDs) and Health Product Declarations (HPDs).
         2) Volatile Organic Content (VOC) Documentation: For adhesives and primers, submit VOC content and emissions documentation as specified in Section 01 81 13 - Sustainable Design Requirements.

D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.
   2. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. See Section 01 91 19 - Building Envelope Commissioning for requirements association with building envelope commissioning applicable to this Section.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section with at least three years of documented experience.

1.08 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.
   1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.
   2. Construct mock-up with specified sealant types and with other components noted.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Warranty: Include coverage for installed sealers that fail to achieve watertight seal or exhibit loss of adhesion or cohesion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Precompressed Foam Seals:
   1. Balco, Inc: www.balcousa.com.
   2. EMSEAL Joint Systems, Ltd: www.emseal.com.
   3. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PRECOMPRESSED FOAM SEALS

A. Precompressed Foam Seal: Acrylic foam impregnated with water-repellent, capable of minimum 20 percent compression and 20 percent expansion, with colored silicone skin, and with self-adhesive faces protected prior to installation by release paper.
   1. Color: As selected by Architect from manufacturer's full range.
   2. Size suitable to provide watertight, vapor tight, and airtight seal when installed.
   3. Calculate size according to manufacturer's recommendations.
   4. Measure size of existing joints before selecting seal width.
   5. Fire-Rating: As indicated on drawings, comply with UL 2079.
   6. Provide product recommended by manufacturer for traffic-bearing use, where applicable.
   7. Applications:
      a. Exterior wall expansion joints.

B. Precompressed Acoustic Foam Seal and Partition Closure; Comprised of waterproof silicone faces on two or three sides open cell foam sealant designed for non-invasive non-mechanical attachment to interior walls.
   1. Color: As selected by Architect from manufacturer's full range of available colors.
   2. Size required to provide acoustic seal when installed.
      a. Calculate size according to manufacturer's recommendations to install seal under compression.
      b. Provide maximum depth of seal available to match partition thickness. For walls greater than 6 inch thick, provide 2 inch deep seal at each face of wall.
      c. Size seal to assure a dust, air, and vision proof seal.
      d. Measure size of existing joints before selecting seal width.
   3. Material complying with Class A flame spread / smoke developed rating in accordance with ASTM E84.
   4. Sound Transmission Class (STC) Rating of 53 when tested in accordance with ASTM E90 at single 2 inch thickness.
   5. Provide seals finished on two sides where located against opaque wall construction at each side. Provide seals finished on three sides where installed against glass or other transparent material.

2.03 ACCESSORIES

A. Adhesive: As recommended by seal manufacturer.

B. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and strip seal.

C. Substrate Cleaner: Non-corrosive, non-staining type recommended by seal manufacturer; compatible with joint forming materials.

D. Primer: Type recommended by seal manufacturer to suit application; non-staining.

E. Backing Tape: Self-adhesive polyethylene tape with surface to which seal will not adhere.

PART 3 EXECUTION

3.01 EXAMINATION

A. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
   1. Verify that joints are ready to receive this work.
   2. Measure joint dimensions and verify that seal products are of the correct size to properly seal the joints. Size seals such that they are in compressed condition when installed.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Properly prepare construction components adjacent to the work of this section to prevent damage and disfigurement due to this work.

B. Remove loose materials and foreign matter that could impair adhesion of sealant.

C. Clean and prime joints in accordance with manufacturer's instructions.

D. Perform preparation in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's written instructions.

B. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

C. Precompressed Foam Seals:

1. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.
2. Prepare joints and install seals in accordance with manufacturer's written recommendations.
3. Remove loose materials and foreign matter that could impair adhesion of sealant.
4. Do not stretch precompressed seal; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items.

1. Replace damaged materials or items with new if repair not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean adjacent soiled surfaces.

3.06 PROTECTION

A. Protect joints from damage until adhesives have properly cured.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. Portions of the work of this section shall be included in the following Trade Bids:
   1. 04 00 01 - Masonry Trade Bid Summary.
   2. 07 00 01 - Waterproofing, Dampproofing, and Caulking Trade Bid Summary: All sealant work shall be assigned to Waterproofing, Dampproofing, and Caulking unless noted otherwise.
   3. 07 00 02 - Roofing and Flashing Trade Bid Summary.
   4. 08 00 01 - Metal Windows Trade Bid Summary.
   5. 08 00 02 - Glass and Glazing Trade Bid Summary.
   6. 09 00 02 - Tile Trade Bid Summary.
   7. 09 00 06 - Terrazzo Trade Bid Summary.
   8. 09 00 07 - Painting Trade Bid Summary.
   9. 21 00 01 - Fire Protection Trade Bid Summary.
   10. 22 00 01 - Plumbing Trade Bid Summary.
   11. 23 00 01 - HVAC Trade Bid Summary.
   12. 26 00 01 - Electrical Trade Bid Summary.
   13. Refer to SEALANT ASSIGNMENT MATRIX in PART 3 of this section for additional requirements

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following joint sealant work:
   1. Sealants and joint backing at miscellaneous interior and exterior joints and penetrations throughout the project, not specifically indicated as part of another section.
   2. Traffic bearing seals.
   3. Hollow gaskets.
   4. Self-leveling pourable joint sealants.
   5. Low-expansion foam sealants.
   6. Joint backings and accessories for a complete installation, including primers and bond breaker tapes.

B. The work of this section shall include sealants and related accessories indicated throughout the drawings and specifications, and joints between dissimilar surfaces visible in the finished spaces.
   1. Joints between running wood trim and substrate surfaces.
   2. Perimeter of access panels in drywall.
   3. Perimeter of interior storefront systems, including joint with flooring.
   4. Perimeter of access panels in masonry.
   5. Joints between masonry and gypsum wall board surfaces at walls and ceilings.
   6. Joints at perimeter of casework and counters at adjacent walls
   7. Perimeters of metal cabinets installed into or onto the face of wall surfaces, including but not limited to:
      a. Fire extinguisher cabinets.
      b. Automatic defibrillator (AED) units.
   8. Sanitary caulking at bathroom fixtures
   9. Perimeter of lockers to adjacent surfaces

10. Secondary sealants at exterior window and door locations as indicated on drawings.
11. Traffic bearing seals at overhead doors.
12. Refer to SEALANT ASSIGNMENT MATRIX in PART 3 of this section.

C. Sealants specified in this section, to be furnished and installed by other trades and sections:
1. Section 04 00 01 - Masonry Trade Bid Summary: Sealants and adhesive sealants within wall flashing assemblies required to facilitate the installation of the work.
2. Section 07 00 02 - Roofing and Flashing Trade Bid Summary Sealants and adhesive sealants within shingle roofing, membrane roofing, and sheet metal flashings required to facilitate the installation of roofing products.
3. Section 08 00 01 - Metal Windows Trade Bid Summary: Primary weather proof sealant at perimeter of window, curtain wall, and storefront assemblies installed simultaneously with the frames / flashings and adjacent construction, and required to complete the building air barrier system..
4. Section 08 00 02 - Glass and Glazing Trade Bid Summary: Glazing sealants and caulks used to install glazing panels within openings.
5. Section 09 00 02 - Tile Trade Bid Summary: Sealants used as tile grout at control joints in floor and wall tile.
6. Section 09 00 07 - Painting Trade Bid Summary: Sealants used as part of painting systems and transitions.
7. Section 21 00 01 - Fire Protection Trade Bid Summary: Sealants used for installation of fire protection items.
8. Section 22 00 01 - Plumbing Trade Bid Summary: Sealants used for installation of plumbing items.
9. Section 23 00 01 - HVAC Trade Bid Summary: Sealants used for installation of ductwork and mechanical items.
10. Section 26 00 01 - Electrical Trade Bid Summary: Sealants used for installation of electrical items.
11. Division 32 Exterior Improvements: Sealants indicated in Civil and Landscape drawings shall be provided by the Division 32 subcontractor(s).
12. Other sealants specifically identified on drawings as belonging to specific sections.
13. Refer to SEALANT ASSIGNMENT MATRIX in PART 3 of this section.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association; aamanet.org.
B. ASTM. ASTM International; www.astm.org.
C. CDPH. California Department of Health; www.cdph.ca.gov.

1.04 REFERENCE STANDARDS

A. Editions of standards as referenced in application building codes, or if not referenced then per the latest editions of the following.
B. AAMA 812 - Voluntary Practice for Assessment of Single Component Aerosol Expanding Polyurethane Foams for Sealing Rough Openings of Fenestration Installations.
C. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.
D. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
E. ASTM C834 - Standard Specification for Latex Sealants.
F. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
G. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

H. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
I. ASTM C1193 - Standard Guide for Use of Joint Sealants.
J. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.
K. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
L. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
M. ASTM C1736 - Standard Practice for Non-Destructive Evaluation of Adhesion of Installed Weatherproofing Sealant Joints Using a Rolling Device.
N. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
O. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
        a. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
        b. List of backing materials approved for use with the specific product.
        c. Backing material recommended by sealant manufacturer.
        d. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
        e. Substrates the product should not be used on.
        f. Substrates for which use of primer is required.
    2. Specimen warranty for each product.
    3. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, and recommended tools.
    4. Description of method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgment that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
    5. Where sealant color is not specified, submit three samples, 2 inches by 2 inches in size, illustrating colors available for selection.
    6. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
    7. Preinstallation Field Adhesion Test Plan: Submit at least four weeks prior to start of installation.
    8. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within ten days after completion of tests; include bagged test samples and photographic records.
    9. Installer's qualification statement.
    10. Specimen warranties.
C. Sustainability Submittals
    1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional

prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The applicable Trade Contractor for each portion of the work of this section, or the Construction Manager for portions of the work of this section that are not assigned to a Trade Contractor , and Construction Manager shall provide documentation indicating applicability of products of this section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Environmental Product Declarations (EPD) and Health Product Declarations (HPD).
        2) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with the following sections:
    a. 01 70 00 - Execution and Closeout Requirements.
    b. 01 78 00 - Closeout Submittals.
2. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. See Section 01 60 00 - Product Requirements for additional provisions.
    b. Extra Materials: Two tubes of sealant for each type and color provided in the project.
3. Executed warranties.

1.06 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.
B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
C. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
1. Adhesion Testing: In accordance with ASTM C794.
2. Compatibility Testing: In accordance with ASTM C1087.
3. Allow sufficient time for testing to avoid delaying the work.
4. Deliver sufficient samples to manufacturer for testing.
5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.

D. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, in accordance with ASTM C1193 for in situ joints, except interior acrylic latex sealants, and include the following for each tested sample.
1. Identification of testing agency.
2. Name(s) of sealant manufacturer's field representatives who will be observing.
3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
    a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
    b. Test date.
    c. Location on project.
    d. Sealant used.
    e. Stated movement capability of sealant.
    f. Test method used.

g. Date of installation of field sample to be tested.
h. Date of test.
i. Copy of test method documents.
j. Age of sealant upon date of testing.
k. Test results, modeled after the sample form in the test method document.
l. Indicate use of photographic record of test.

E. Building envelope commissioning is included as part of the project. See Section 01 91 19 - Building Envelope Commissioning for requirements associated with building envelope commissioning applicable to this section.
1. Associated testing that will be performed by the Owner's testing agent and the Commissioning Agent will include:
a. Sealant adhesion tests in accordance with ASTM C1521 and ASTM C1736.
1) Testing will include a minimum of five tests for the first 1000 linear feet of joint installation, and one additional test for every 1000 linear feet of installation thereafter.
2) Contractor shall cooperate with testing agency, provide access for conducting tests, repair failures discovered, and replace any joint materials damaged as a result of testing at no additional cost to the project.

1.07 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building and includes work of this section.
1. See Section 01 40 00 - Quality Requirements for additional requirements.
2. Construct mock-up with specified sealant types and with other components noted.
3. Following acceptance of submittals for material components and selection of colors provide materials of each color selected, installed in place on the mock up for final review by Architect prior to proceeding with the work.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Manufacturer Warranties: Provide manufacturer warranties for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.
1. Exterior silicone sealants shall be warrantied for 20 years from the date of Substantial Completion.
2. All other sealants shall be warrantied for five years from the date of Substantial Completion.
C. Extended Correction Period: Correct defective work within five-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gunnable and Pourable Nonsag Sealants: Permitting application in joints on vertical surfaces without sagging or slumping.
1. Subject to compliance with these specifications, provide products of one of the following:
a. Bostik Inc: www.bostik-us.com.
b. Dow: www.dow.com.
c. Master Builders Solutions: www.master-builders-solutions.com/en-us.
d. Pecora Corporation: www.pecora.com.
e. Sika Corporation: www.usa.sika.com.
f. Tremco Commercial Sealants and Waterproofing: www.tremcosealants.com.

g. W.R. Meadows, Inc: www.wrmeadows.com.
h. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2. Polyurethane Sealants:
   a. Subject to compliance with these specifications, provide products of one of the following:
      1) Master Builders Solutions; Product MasterSeal NP2: www.master-builders-solutions.basf.us/en-us.
      2) Pecora Corporation; DynaTrol II General Purpose Two Part Polyurethane Sealant: www.pecora.com.
      3) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
3. Silicone Sealants:
   a. Subject to compliance with these specifications, provide products of one of the following:
      1) Dow; Product: Dow 795; www.dowcorning.com.
      2) Pecora Corporation; Pecora 864: www.pecora.com.
      3) Tremco Commercial Sealants and Waterproofing; Tremco Spectrem 1: www.tremcosealants.com.
      4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
4. Silicone Seal and Adhesive Sealant: For installation of silicone sheet flashing into perimeter glazing pockets of curtain walls and adhering it to VRAIB.
   a. Subject to compliance with these specifications, provide products of one of the following:
      1) Dow Corning Corporation; Products: Dow 123 Silicone Seal and Dowsil 795 Silicone Building Selant: www.dowcorning.com.
      2) Pecora Corporation; Products: Pecora Sil-Span seal and 864NST sealant: www.pecora.com.
      3) Tremco Global Sealants; Products: Tremco Silicone Extruded Sheet seal and Spectrem 1 Silicone Sealant: www.tremcosealants.com.
      4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
5. Acrylic Emulsion Latex Sealants:
   a. Subject to compliance with these specifications, provide products of one of the following:
      1) Master Builders Solutions by BASF: MasterSeal NP 520: www.master-builders-solutions.basf.us/en-us.
      2) Pecora Corporation; Product AC 20 +Silicone: www.pecora.com.
      3) Tremco Commercial Sealants and Waterproofing; Product Tremflex 834: www.tremcosealants.com.
      4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality,

durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Self-Leveling Sealants: Pourable or self-leveling sealants having sufficient flow to form a smooth, level surface when applied in a horizontal joint.
   1. Subject to compliance with these specifications, provide products of one of the following:
      a. Bostik Inc: www.bostik-us.com.
      b. Master Builders Solutions; MasterSeal SL 1: www.master-builders-solutions.com/en-us.
      c. Pecora Corporation; 300 SL: www.pecora.com.
      d. Tremco Commercial Sealants and Waterproofing; Vulkem 45SSL: www.tremcosealants.com.
      e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Low-Expansion Foam Sealants:
   1. Subject to compliance with these specifications, provide products of one of the following:
      a. RHH Foam Systems, Inc.; Versi-Foam; Versi-Foam Versitite: www.rhhfoamsystems.com.
      b. Bostik Inc.; Window & Door Foam: www.bostik-us.com.
      c. Todol Products; Pur Fill WF; www.todol.com. (Basis of Design)
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
      a. Wall expansion and control joints.
      b. To-the-weather joints between doors, windows, curtain wall, storefront, louvers, and access panels, and other frames or adjacent construction.
      c. Openings below ledge angles in masonry.
      d. Penetrations of VR/AIB.
      e. Other joints indicated below or on drawings.
   2. Interior Joints: Seal all gaps and joints where indicated on drawings, and between dissimilar materials, including but not limited to the following:
      a. Joints between doors, windows, curtain wall, storefront, access doors, and other frames and adjacent construction.
      b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings, between wall / ceiling and other construction; and other flanking sound paths.
         1) See Section 09 21 16 - Gypsum Board Assemblies.
         2) Exceptions:
            (a) Do not seal gaps and openings between gypsum board finished stud walls and suspended ceilings
            (b) Do not seal through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
      c. Other joints indicated below or on drawings.

3. Do Not Seal:
    a. Intentional weep holes in masonry or window assemblies. If unsure, confirm with Architect.
    b. Joints between suspended ceilings and walls.

B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.
1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, noncuring.
2. Lap Joints between Manufactured Metal Panels: Butyl rubber, noncuring, non-skinning.
3. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane traffic-grade sealant.
    a. Work shall be by site contractor.

C. Interior Joints: Use nonsag paintable emulsion acrylic latex sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
2. Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion.
3. Floor Joints in Wet Areas: Silicone traffic-grade sealant suitable for continuous liquid immersion.
4. Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Non-sag epoxy sealant with high tensile strength.
5. Joints Between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
    a. See Section 09 30 00 for sealing between tile and plumbing fixtures.
6. Penetrations in non-rated gypsum wall and ceiling assemblies: Acrylic emulsion latex sealant.
7. Joints at edges of slabs: Self-leveling polyurethane traffic-grade sealant.

D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

E. Areas Where Tamper-Resistance is Required: As indicated on drawings.

F. Preformed Joint Seals: See Section 07 91 00 - Preformed Joint Seals for information.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; comply with applicable codes and regulations, and see Section 01 81 13 - Sustainable Design Requirements.

2.04 NONSAG JOINT SEALANTS

A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M, A, G, and O; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Color: To be selected by Architect from manufacturer's standard range.
5. Service Temperature Range: Minus 20 to 180 degrees F.

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: White.

C. Nonsag Traffic-Grade Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Color: To be selected by Architect from manufacturer's standard range.

D. Epoxy Sealant: ASTM C881/C881M, Type I and III, Grade 3, Class B and C; two-component, not expected to withstand continuous water immersion or traffic.
   1. Hardness Minimum: 80, Shore D, when tested in accordance with ASTM C661.
   2. Color: To be selected by Architect from manufacturer's standard range.
   3. Products: Subject to compliance with these specifications, provide products of one of the following:
      a. Pecora Corporation; DynaPoxy EP-1200 Two-Part Epoxy Security Sealant: www.pecora.com. (Basis of Design)
      b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

E. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).

F. Noncuring Butyl Sealant: Solvent-based, single component, nonsag, nonskinning, nonhardening, nonbleeding; nonvapor permeable; intended for fully concealed applications.

2.05 SELF-LEVELING JOINT SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.

B. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
   1. Movement Capability: Plus and minus 25 percent, minimum.

C. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single or multi-component.

2.06 LOW-EXPANSION FOAM SEALANTS

A. One-component, minimal-expansion closed-cell polyurethane foam sealant specially formulated for sealing cracks and gaps at perimeters of window, door, access panel, and louver opening frames, to provide full cavity fill without warping or bowing frames.
   1. Product shall meet pressure test of AAMA 812.
   2. Shrinkage: not more than 5 percent after first 24 hours.
   3. Water Absorption: not more than 1 percent.
   4. Tensile Strength: minimum 20 pounds per square inch.
   5. R Value at 1 inch thickness: 4 minimum.
   6. Flamespread: less than 25 when tested in accordance with ASTM E84.
   7. Smoke Developed: less than 25 when tested in accordance with ASTM E84.

B. Miscellaneous Air Sealing Materials: Provide caulking with approved caulking compound at all locations requiring air infiltration sealing that are too small (3/16 inch or less) for foam sealants.

2.07 ACCESSORIES

A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, application, and suitability for pedestrian or vehicular traffic where applicable.
   1. Sealant Backing Rod, Closed-Cell Polyethylene Type:
      a. Cylindrical flexible sealant backings complying with ASTM C1330 Type C.
      b. Size: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Carefully examine installation areas with Installer/applicator present, for compliance with requirements affecting work performance.
   1. Verify that joints are ready to receive work.
   2. Verify that backing materials are compatible with sealants.
   3. Verify that backer rods are of the correct size.
   4. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
      a. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
      b. Notify Architect of date and time that tests will be performed, at least seven days in advance.
      c. Arrange for sealant manufacturer's technical representative to be present during tests.
      d. Record each test on Preinstallation Adhesion Test Log as indicated.
      e. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
      f. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

C. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

D. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.
C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
D. Install bond breaker backing tape where backer rod cannot be used.
E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range or will be outside that range during any part of the entire installation and curing period, unless manufacturer's approval is obtained and instructions are followed. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
H. Low-expansion Foam Sealants (polyurethane) shall be applied at roof insulation joints, in the spaces within the framing around all exterior windows (head, jamb, and sill), all exterior doors (head and jamb), exterior louvers, and all exterior access panels (head, jamb, and sill), and other locations where full-expansion foam or spray-applied foam insulation is not possible. Low-expansion foam sealants shall be installed per manufacturer’s instructions and recommendations to provide a continuous seal between the window, door, or louver unit and the adjacent component of the building’s air barrier system.
    1. All window, door, louver, and access panel jambs shall be adequately braced, if necessary, to prevent the expanding foam sealant from bowing or springing the jambs or jamb extensions. Foam sealant in these spaces shall be adequate to create a seal, but the spaces are not required to be filled unless required elsewhere in the Contract Documents (reduces the need for bracing).
    2. Clear all cracks, spaces, voids, and openings to be sealed of debris, moisture, ice, and materials prior to the commencement of foaming operations. Clean substrates of substances harmful to insulations, including moisture, dirt, or unbonded coatings which will affect the insulation or prevent an air-tight seal. Hold exterior air barrier materials to the outside of the spaces around rough openings to allow a jamb-to-framing seal.
    3. Cover all joints and close off openings to prevent foam leakage. Check to ensure that the cavities to be sealed are properly finished, that they are free of debris and that the surfaces are anchored to framing members.
    4. Mask areas to be protected from overspray.
    5. At penetrations and other locations specified use two-component, full-expansion foam.
        a. See Section 07 21 19 - Foamed-In-Place Insulation.
I. Silicone Seals: For installation of silicone sheet flashing into perimeter glazing pockets of curtain walls and adhering it to VRAIB:
    1. Install seals adhered to VR/AIB over perimeter blocking at glazed aluminum curtain wall openings.
    2. Seals shall be furnished by and initially installed by the Waterproofing, Dampproofing, and Caulking Trade Contractor to the installed VR/AIB surface with the glazed-end of seals left loose in place.
    3. Glazed-end of silicone seals shall be securely installed into aluminum curtain wall systems, into the system glazing pocket, by the Metal Windows Trade Contractor.
    4. Metal Windows Trade Contractor and Waterproofing, Dampproofing, and Caulking Trade Contractor shall be jointly responsible for air and water tightness. Both Trade Contractors

shall prepare for and participate in building envelope testing as described in Section 01 91 13 - MEP Commissioning Requirements, Section 01 81 10 - Whole Building Air Pressurization Testing and associated specification sections, including curtain wall air and water infiltration testing and whole building air pressurization testing. If portions of the curtain wall perimeter fail any Commissioning tests, both the Metal Windows Trade Contractor and the Waterproofing, Dampproofing, and Caulking Trade Contractor shall evaluate and identify the precise location of the failure and the Trade Contractor responsible for the failed portion of the installation shall be responsible for correction.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Building envelope commissioning is included as part of the project. See PART 1 QUALITY ASSURANCE article for testing that will be performed by the Owner 's testing agent and the Commissioning Agent.

C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

D. Repair destructive test location damage immediately after evaluation and recording of results.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean adjacent surfaces that are soiled as a result of joint sealants work.

3.06 PROTECTION

A. Protect sealants until cured.

3.07 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width, i.e., at low temperature in thermal cycle. Report failures immediately and repair them.

3.08 SEALANT ASSIGNMENT MATRIX

A. Exterior Joint Sealants: List of joint locations is not project-specific and may contain joint types not included in the scope of work.

Joint Location: Building Exterior	**Subcontractor Assignment**	**Sealant Type**	**Notes**
Veneer Masonry to Veneer Masonry	SC-MASN	Silicone	
Veneer Masonry to Metal Panel System	Metal panel installer	Silicone	
Veneer Masonry to other cladding system	SC-WDC	Silicone	
Joints within cladding system, for all types of metal panel cladding systems	Metal panel cladding system installer	Silicone	
Cladding system to exposed structural member	SC-WDC	Silicone	
Joints at exposed exterior structural systems	SC-WDC	Silicone	
Fascia / roof edge to building cladding	SC-WDC	Silicone	
Window to adjacent cladding - exposed to view	SC-WDC	Silicone	
Curtain wall and Storefront to adjacent cladding - exposed to view	SC-WDC	Silicone	

Joint Location: **Building Exterior**	**Subcontractor Assignment**	**Sealant Type**	**Notes**
Other metal door frames to adjacent cladding - exposed to view	SC-WDC	Silicone	
Miscellaneous metals to adjacent cladding - exposed to view	SC-WDC	Silicone	
Exterior louvers to adjacent cladding	SC-WDC	Silicone	
Mechanical penetrations at cladding	Subcontractor responsible for penetration	Silicone	
Building movement / expansion joints - horizontal and vertical, except roof	SC-WDC	Silicone	
Window system primary sealant to VR/AIB	SC-WIND	Silicone	
Curtain wall and Storefront primary sealant to VR/AIB	SC-WIND	Silicone	
Low-expansion foam sealant at opening perimeters	Subcontractor responsible for opening	Low expansion foam insulation	
Other metal door frames to VR/AIB	SC-WDC	Silicone	
Exterior louvers to VR/AIB	SC-WDC	Silicone	
Mechanical, Electrical, Plumbing, and Fire Protection at VR/AIB	SC-WDC	Silicone	
Expansion joints in exterior concrete paving	Subcontractor responsible for paving	Polyurethane	
Concrete paving to Masonry Veneer or Precast Concrete Veneer	Subcontractor responsible for paving	Polyurethane	
Construction joints in Cast-In-Place Concrete walls	SC-WDC	Silicone	
Metal flashing system joints	Subcontractor responsible for flashing installation	Per manufacturer's requirements	
Metal flashing to adjacent cladding system	SC-WDC	Silicone	
Metal flashing termination at VR/AIB	Subcontractor responsible for flashing installation	Per manufacturer's requirements	
Fiber Cement Siding	Siding installer	Per manufacturer's requirements	
Sealants within metal roofing systems	SC-ROOF	Per manufacturer's requirements	
Sealants within membrane roofing systems	SC-ROOF	Per manufacturer's requirements	

B. Interior Joint Sealants: List of joint locations is not project specific and may contain joint types not included in the scope of work.

Joint Location: Building Interior	**Subcontractor Assignment**	**Sealant Type**	**Notes**
Window system to adjacent interior finish material	SC-WDC	Acrylic emulsion latex	
Curtain wall and Storefront systems to adjacent interior finish material	SC-WDC	Acrylic emulsion latex	
Painted surface to painted surface	SC-WDC	Acrylic emulsion latex	
Painted surface to unpainted surface	SC-WDC	Acrylic emulsion latex	
Painted surface to installed pre-finished equipment	SC-WDC	Acrylic emulsion latex	
Painted surface to installed millwork or casework	Per Construction Manager assignment	Acrylic emulsion latex	
Unpainted surface to installed millwork or casework	Per Construction Manager assignment	Acrylic emulsion latex	
Tile expansion or control joints	SC-TILE	Polyurethane	
Tiled area to adjacent painted surface	SC-WDC	Acrylic emulsion latex	
Tiled area to window, curtain wall, and storefront systems	SC-WDC	Acrylic emulsion latex	
Tiled area to installed millwork or casework	SC-WDC	Acrylic emulsion latex	
Tiled area to installed pre-finished equipment	SC-WDC	Acrylic emulsion latex	
Control joints within terrazzo work and other joints at terrazzo, where indicated on drawings.	SC-TER	Terrazzo manufacturer's recommended sealant type	
Joints between fixtures in wet areas and floors, walls, ceilings	SC-PLUMB	Mildew-resistant silicone sealant	
Gypsum assembly acoustic sealant at perimeter	Gypsum assembly installer	Acoustic sealant	
Gypsum assembly - top of wall	Gypsum assembly installer	Acoustic spray insulation	See Section 07 21 19
Penetrations at non-fire resistive rated or acoustic assemblies	Subcontractor responsible for penetration	Acoustic sealant	
Masonry partition control / expansion joint	SC-MASN	Acrylic emulsion latex	
Masonry partition rake and seal joint	SC-MASN	Acrylic emulsion latex	
Masonry partition to exposed structural element	SC-WDC	Acrylic emulsion latex	

Joint Location: Building Interior	**Subcontractor Assignment**	**Sealant Type**	**Notes**
Concrete slab on grade - control or expansion joints exposed to view	Concrete slab finisher	Polyurethane	
Concrete slab on grade to wall finishes - exposed to view	SC-WDC	Polyurethane	
Pick-proof sealant	SC-WDC	Pick-proof epoxy	Minimum Shore A hardness: 80
Interior exposed joints not otherwise indicated	Per Construction Manager assignment	Product most appropriate to use and substrate	

END OF SECTION

SECTION 08 00 01
METAL WINDOWS TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Metal Windows Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1 through 8, 10, and 11. as most recently amended.

B. Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid bond specified therein.

C. Every Trade Bid for work under this ection shall be on the form in this project manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Metal Windows Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the Metal Windows subcontractor or an entity engaged by the Metal Windows subcontractor, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this section includes furnishing and installing all metal windows work, as indicated in Paragraph 1.03 C below, as shown on drawings, as described in specifications, or as reasonably inferred from either drawings or specifications, in the judgement of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 08 00 01 or the abbreviation "SC-WIND".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:
   1. Section 08 34 53 - Bullet Resistant Entry Systems.
   2. Section 08 43 13 - Aluminum-Framed Storefronts.
   3. Section 08 44 13 - Glazed Aluminum Curtain Walls.
   4. Section 08 44 35 - Fire-Rated Glazed Assemblies.
   5. Section 08 51 13 - Aluminum Windows.
   6. Section 08 56 59 - Service and Teller Window Units.

D. The work of this Trade Bid Section shall include part of the scope of each of the following sections:
   1. Section 07 21 19 - Foamed-In-Place Insulation: For gaps between frames or subframes and wall construction, to be furnished and installed by this Trade Contractor.
   2. Section 07 92 00 - Joint Sealants: For primary weather seal joints installed by this Contractor.
   3. Section 08 71 00 - Door Hardware.
   4. Section 08 80 00 - Glazing: For insulated and non-insulated glass units installed in products of sections listed in Paragraph 1.03-C, above.

E. The Metal Windows Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Commissioning Sections 01 91 13 - MEP Commissioning Requirements and 01 91 19 - Building Envelope Commissioning: list of items to be commissioned and requirements for cooperation with the Commissioning Agent; and required field testing.
   2. Section 04 20 00 - Unit Masonry.
   3. Section 04 72 00 - Cast Stone Masonry.
   4. Section 06 10 00 - Rough Carpentry.
   5. Section 07 21 00 - Thermal Insulation.
   6. Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers.
   7. Section 07 91 00 - Preformed Joint Seals.
   8. Section 09 21 16 - Gypsum Board Assemblies.
   9. Section 10 71 13.43 - Fixed Sun Screens.
   10. Section 12 24 00 - Window Shades.
   11. Section 12 48 13 - Entrance Floor Mats and Frames.
   12. Division 22: Plumbing sections.
   13. Division 23: HVAC sections.
   14. Division 26: Electrical sections.

F. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

G. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Bidder shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, and all project detail sheets for

general and code-related information, installation or other conditions and instructions that directly affect their work.

H. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

J. Cutting and Patching:
   1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical sections. Where any of the sections listed as part of this Trade Bid indicate that cutting and coring shall be performed by parties other than the Metal Windows Trade Contractor, the cost of such cutting and coring necessary for the work of this section shall be borne by the Metal Windows Trade Contractor.
   2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
   3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
   4. Any and all cutting of structural members, including floor slabs, shall require approval of the project's structural engineer; see Structural Drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those indicated on Structural Drawings, obtain approval from Structural Engineer of Record.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for Reference Standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See each individual technical specification section listed above for product information, samples, shop drawings, and other submittals required.

1.06 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.07 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to any product submittals, the Metal Windows Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will contribute toward LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Metal Windows Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for

submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.08 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section, and other components of the exterior walls and roof assemblies.
   1. See Section 01 40 00 - Quality Requirements for exterior building envelope mock-up requirements.

1.09 WARRANTY

A. See Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. See each individual technical specification section listed above for specific warranty requirements.

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

2.01 CLEANING

A. Metal Windows Trade Contractor shall be responsible for cleaning up Metal Windows Trade Contractor's own work at the end of each day, and depositing waste and debris created by Metal Windows Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.
   1. See Section 01 50 00 - Temporary Facilities and Controls.
   2. See Section 01 74 19 - Construction Waste Management and Disposal.

SECTION 08 00 02
GLASS AND GLAZING TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Glass and Glazing Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1 through 8, 10, and 11, as most recently amended.

B. Glass and Glazing Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid bond specified therein.

C. Every Trade Bid for work under this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Glass and Glazing Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the Glass and Glazing subcontractor or an entity engaged by the subcontractor, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this section includes furnishing and installing all glass and glazing not assigned to other trades, as shown on the drawings, as described in the specifications, or as reasonably inferred from either, in the judgment of the Architect.

1. The term "glazing" shall include both the noun and verb definitions of this word.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 08 00 02 or the abbreviation "SC-GLASS".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:
   1. Section 08 83 00 - Mirrors.
D. The work of this Trade Bid Section shall include part of the scope of each of the following sections:
   1. Section 07 92 00 - Joint Sealants.
   2. Section 08 80 00 - Glazing: for all interior glazing applications except within storefront systems, including glazing in hollow metal door and borrowed lite frames, and door vision panels.
E. The Glass and Glazing Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Commissioning Sections 01 91 13 - MEP Commissioning Requirements and 01 91 19 - Building Envelope Commissioning: list of items to be commissioned and requirements for cooperation with the Commissioning Agent; and required field testing.
   2. Section 08 11 13 - Hollow Metal Doors and Frames: sizes of glass vision panels in doors and side and borrowed lites.
   3. Section 08 14 16 - Flush Wood Doors: sizes of glass vision panels in doors.
   4. Section 08 34 53 - Bullet Resistant Entry Systems: consistency of appearance of glazing provided by that section.
   5. Section 08 34 73 - Sound Control Door Assemblies: sizes of glass vision panels in doors.
   6. Section 08 43 13 - Aluminum-Framed Storefronts: sizes of glass vision panels in doors and side and borrowed lites, and consistency of appearance of glazing provided by that section..
   7. Section 08 44 13 - Glazed Aluminum Curtain Walls: consistency of appearance of glazing provided by that section.
F. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.
G. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Bidder shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.
H. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.
I. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.
J. Cutting and Patching:

1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical sections. Where any of the sections listed as part of this Trade Bid indicate that cutting and coring shall be performed by parties other than the Glass and Glazing Trade Contractor, the cost of such cutting and coring necessary for the work of this section shall be borne by the Glass and Glazing Trade Contractor.
2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
4. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for reference standards.

1.05 SUBMITTALS

A. See each individual technical specification section listed above for required product information, samples, shop drawings, and other submittals required.

B. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.06 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, the Glass and Glazing Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Glass and Glazing Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.07 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.08 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section, and other components of the exterior walls and roof assemblies.

1. See Section 01 40 00 - Quality Requirements for exterior building envelope mock-up requirements.

1.09 WARRANTY

A. See each individual technical section listed above for warranty requirements.

B. See Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS)

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

3.01 CLEANING

A. Glass and Glazing Trade Contractor shall be responsible for cleaning up Glass and Glazing Trade Contractor's own work at the end of each day, and depositing waste and debris created by Glass and Glazing Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, and delivering, the following hollow metal (HM) products as specified, as scheduled, and as shown in the Contract Documents.
   1. Non-fire-rated hollow metal doors and frames.
   2. Steel frames for fire-rated and non fire-rated wood doors.
   3. Fire-rated hollow metal doors and frames, including borrowed lite frames.
   4. Thermally insulated hollow metal doors with frames.
   5. Steel glazing frames for fixed glazing in frames and door panels.
   6. Design, fabricate, furnish, and install exterior doors and frames with or without glazed vision panels and fixed sidelights and / or transom panels.
   7. Accessories, including glazing, louvers, matching panels, and matching fixed panels, anchors, and fasteners.

B. Products of this Section shall be furnished to the following sections for installation per the PART 3 requirements stated herein:
   1. Section 04 20 00 - Unit Masonry: Door frames to be incorporated into masonry partitions.
   2. Section 06 20 00 - Finish Carpentry: Door frames to be incorporated into partitions other than masonry.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA. Americans with Disabilities Act; www.ada.gov.
B. ANSI. American National Standards Institute; www.ansi.org.
C. ASTM. ASTM International; www.astm.org.
D. BHMA. Builders Hardware Manufacturers Association: www.buildershardware.com.
E. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov.
F. HMMA. Hollow Metal Manufacturers Association.
G. ICC. International Code Council; www.iccsafe.org.
H. ITS. Intertek Testing Services: www.intertek.com.
I. NAAMM. National Association of Architectural Metal Manufacturers; www.naamm.org.
J. NFPA. National Fire Protection Association; www.nfpa.org.
K. NFRC. National Fenestration Rating Council: www.nfrc.org.
L. SDI. Steel Door Institute; www.steeldoor.org.
M. UL. Underwriters Laboratories; www.ul.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ADA Standards - 2010 ADA Standards for Accessible Design.
C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100).
D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
E. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies for Protection of Building Envelopes.
F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

G. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
H. ASTM C476 - Standard Specification for Grout for Masonry.
I. ASTM C1199 - Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods.
J. ASTM E1423 - Standard Practice for Determining Steady State Thermal Transmittance of Fenestration Systems.
K. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
L. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
M. ICC A117.1 - Accessible and Usable Buildings and Facilities.
N. ITS (DIR) - Directory of Listed Products.
O. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames.
P. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames.
Q. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames.
R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
T. NFRC 100 - Procedure for Determining Fenestration Product U-factors.
U. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames.
V. SDI 113 - Standard Practice for Determining the Steady-State Thermal Transmittance of Steel Door and Frame Assemblies.
W. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.
X. UL (DIR) - Online Certifications Directory.
Y. UL 10B - Standard for Fire Tests of Door Assemblies.
Z. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
        a. Product data indicating that maximum opening force for installed doors complies with applicable federal and state accessibility standards.
        b. Product data for bituminous coating at specific frames where required by this section to be coated by the Masonry Trade Contractor.
    2. Submit Test Reports and Certificates for labeled doors and frames.
    3. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
    4. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
C. Sustainability Submittals
    1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Pre- and Post-consumer recycled conte
        2) Environmental Product Declarations (EPD).
        3) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Include recommended maintenance and cleaning methods.
3. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish Hollow Metal Doors and Frames system materials from one manufacturer for entire Project.
B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, NAAMM/ HMMA Hollow Metal Manual requirements, Section 01 60 00 - Product Requirements, and as follows:
1. Remove wraps or covers from doors and frames upon delivery at the building site.
2. Promptly clean and touch up with rust inhibitive primer each scratch or disfigurement caused by shipping or handling.
3. See that materials are properly stored on planks or dunnage in a dry location.
4. Doors shall be stored in a vertical position spaced with blocking.
5. Materials shall be covered to protect them from damage in such a manner as to permit air circulation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
1. Subject to conformance with project requirements, provide products from one of the following manufacturers:
    a. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
    b. Curries, an Assa Abloy Group company: www.assaabloydss.com.
    c. Philipp Manufacturing; www.philipp-mfg.com.
    d. Pioneer Industries Inc.: www.pioneerindustries.com.
    e. Republic Doors, an Allegion brand: www.republicdoor.com.
    f. Steelcraft, an Allegion brand: www.allegion.com.
    g. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE REQUIREMENTS

A. Fabrication Methods and Product Quality: In accordance with NAAMM/ HMMA Hollow Metal Manual.

B. Accessibility: Comply with ADA Standards and applicable state accessibility standards, as listed in Section 01 41 00 - Regulatory Requirements.
   1. Maximum Opening Force for Doors: comply with federal and state accessibility standards for door types and applications.
C. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
D. Door Edge Profile: Beveled, both sides.
E. Typical Door Face Sheets: Flush.
F. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
G. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
H. Galvanizing Units at exterior, high humidity spaces, unconditional spaces, areas subject to frequent water contact, and as indicated in schedule: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
I. Fire Labeled Doors and Frames: Construct in accordance with UL 10B and in accordance with Underwriters Laboratories or other recognized testing agency having a factory inspection service.
   1. If a door or frame specified to be fire rated cannot qualify for required labeling because of its design, hardware or any other reason, Construction Manager shall so advise and get Architect's direction before fabricating work on that item is started.

2.03 HOLLOW METAL PANELS: SAME CONSTRUCTION, PERFORMANCE, AND FINISH AS DOORS.

A. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.04 HOLLOW METAL DOORS

A. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI 100).
      a. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
   2. Impact Rating per ANSI/SDI A250.13 Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies for Protection of Building Envelopes. All exterior doors and frames shall be of gage and construction to meet or pass this standard.
   3. Door Core Material: Vertical steel stiffeners with fiberglass or polyurethane insulation, meeting specified thermal resistance.
   4. Door Thermal Resistance: R-Value of 10, when tested in accordance with ASTM C1199, ASTM E1423, SDI 113, and NFRC 100.
   5. Door Thickness: 1-3/4 inches, nominal.
   6. Top Closures for Outswinging Doors: Flush with top of faces and edges.
   7. Weatherstripping: Refer to Section 08 71 00 - Door Hardware. Where indicated in tested assemblies, provide door weatherstripping elements factory-installed to door leaf.
   8. Door Finish: Factory primed and field finished.
B. Interior Doors, Non-Fire-Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI 100).

2. Door Thickness: 1-3/4 inches, nominal.
3. Door Finish: Factory primed and field finished.

C. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
2. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
3. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
4. Provide units listed and labeled by UL (DIR) or ITS (DIR).
a. Attach fire rating label to each fire rated unit.
5. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
6. Door Thickness: 1-3/4 inches, nominal.
7. Door Finish: Factory primed and field finished.

2.05 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Exterior Door Frames: Full profile/continuously welded type, with integral thermal break.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
2. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
3. Weatherstripping: Separate, see Section 08 71 00 - Door Hardware.
4. Thermal Break: Manufacturer's standard PVC thermal break configuration.
5. Provide four-sided frames where indicated or scheduled in Drawings.

C. Interior Door Frames, Non-Fire Rated: Face welded type except where knock-down frames are specifically scheduled or permitted by the Architect. Knock-down frames will only be allowed in certain instances for renovation / replacement.
1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.

D. Door Frames, Fire-Rated: Face welded type.
1. Fire Rating: Same as door, labeled.

E. Mullions for Pairs of Doors: Removable type, as scheduled, or if not scheduled, fixed type similar in profile to frame; refer to Section 08 71 00 - Door Hardware.

F. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

G. Transom Bars: Fixed, of profile same as jamb and head.

2.06 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
1. Apply only to frames installed in masonry, to the inside of the frames.
2. Fire-Rated Frames: Comply with fire rating requirements indicated.

2.07 ACCESSORIES

A. Louvers: Roll formed steel with overlapping frame; finish same as door components ; factory-installed.
1. In Fire-Rated Doors: UL (DIR) or ITS (DIR) listed fusible link louver, same rating as door.

B. Glazing: As specified in Section 08 80 00, factory installed.

C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
D. Astragals for Double Doors: Specified in Section 08 71 00.
E. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
F. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.
C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

A. HM doors and frames furnished to Section 04 20 00 - Unit Masonry or Section 06 20 00 - Finish Carpentry for installation, shall be in accordance with the requirements of the specified door grade standard, NAAMM HMMAA Hollow Metal Manual requirements, approved submittals, Drawings, and as follows:
    1. Install fire rated units in accordance with NFPA 80.
    2. Coordinate frame anchor placement with wall construction. Provide metal shims where required.
    3. Exposed field welds shall be finished smooth and touched up with a rust inhibitive primer.
    4. The Section 04 20 00 - Unit Masonry Trade Contractor shall grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames. See Section 04 20 00 - Unit Masonry.
        a. Grout or other bonding material shall be cleaned off the frames or doors immediately following installation.
        b. Hollow metal surfaces shall be kept free of grout, tar, or other bonding material or sealer.
    5. Coordinate installation of hardware with the Section 08 71 00 contractor.
    6. Coordinate installation of glazing with the glazing Trade Contractor.

3.03 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for Additional requirements.
B. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
    1. Finish touch-up damaged surface finishes.
    2. Replace damaged materials or items with new if repair is not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

3.07 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Adjust closers for closure.

3.08 SCHEDULE

A. See Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing interior flush wood doors; flush and flush glazed configuration; fire-rated and non-rated, as scheduled and indicated on Contract Drawings.
   1. Products shall be furnished by this Section for installation by Section 06 20 00 - Finish Carpentry, pursuant to the installation requirements stated herein.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA: Americans with Disabilities Act: www.ada.gov.
B. AWI: American Wood workers Institute; www.awinet.org
C. AWMAC: Architectural Woodwork Manufacturer's Association of Canada; www.awmac.com.
D. CDPH: California Department of Health; www.cdph.ca.gov.
E. CARB: California Air Resources Board; www.arb.ca.gov.
F. EPD: Environmental product declaration.
G. FSC: Forest Stewardship Council; us.fsc.org.
H. NAF: No Added Formaldehyde.
I. NFPA: National Fire Protection Association; www.nfpa.org.
J. OTC: Ozone Transport Commission; www.otcair.org.
K. SCLC: Structural composite lumber core.
L. UL: Underwriters Laboratories Inc.; www.ul.org.
M. USGBC: U.S. Green Building Council; www.usgbc.org.
N. ULEF: Ultra-Low Emitting Formaldehyde.
O. WDMA: Window and Door manufacturers Association; www.wdma.com.
P. WI: Woodwork Institute; www.woodworkinstitute.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ADA Standards - 2010 ADA Standards for Accessible Design.
C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.
D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards.
E. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
F. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.
G. FSC - Forest Stewardship Council.
H. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
I. OTC (VOC/HAP) - Ozone Transport Commission.
J. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.
K. WDMA I.S. 1A - Interior Architectural Wood Flush Doors.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals

1. Product Data: Indicate door core materials and construction; veneer species, type and characteristics. Provide data indicating that maximum opening force for installed door complies with applicable federal and state accessibility standards.
2. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, and other details.
    a. Provide information per requirements of AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
3. Samples: Submit three samples of door construction, 5 by 5 inches in size cut from top corner of door.
4. Samples: Submit three samples of door veneer, 8 by 10 inches in size illustrating wood grain pattern, color, veneer cut, veneer flitch match, stain color, and sheen.
    a. The submitted and accepted veneer samples shall be used as the standard establishing acceptable color variation, grain pattern variation, small burl or pin knot and cross bar limitations for the project.
5. Finish Mock-up for Stain Selection. Provide mock-up of not more than five stains on the specified wood veneer for final stain selection.
    a. Wood finishes for the project shall be coordinated across all exposed finished wood products and items, including finished wood products and items specified in other sections. The initial finished wood product samples submitted for selection under any such section which has been reviewed and accepted by the Architect shall serve as the basis of review and coordination for other finished wood products and items for the project.
6. Test Reports: Show compliance with specified requirements for the following:
    a. Sound-retardant doors and frames; sealed panel tests are not acceptable.
7. Specimen warranty.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Pre-Consumer and Post-Consumer Recycled Content.
        2) FSC-certified wood products.
        3) Environmental Product Declarations (EPD).
        4) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.
        5) Ultra Low-Emitting Formaldehyde (ULEF) or No Added Formaldehyde (NAF) in plywood, and other sheet or composite wood products compliant with CARB (ATCM) limits.

D. Closeout Submittals
1. Submit in accordance with the following:
    a. Section 01 70 00 - Execution and Closeout Requirements
    b. Section 01 78 00 - Closeout Submittals.

2. Maintenance Data: Include recommended maintenance and cleaning methods.
3. Warranty, executed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish flush door system materials from one manufacturer for entire Project, unless otherwise acceptable to Architect.

B. VOC Requirements: Product finishes shall meet project's LEED requirements and OTC (VOC/HAP) limits.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 60 00 - Product Requirements.

B. Comply with manufacturer's instructions and recommendations, AWI/AWMAC/WI (AWS) Premium Standard.

1. Package, deliver and store doors in accordance with specified quality standard.
2. Accept doors on site in manufacturer's packaging, and inspect for damage.
3. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.
4. Label each door by door number indicated in Architectural Documents and submittals.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.

1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors: subject to compliance with these specifications, provide products of one of the following.

1. Lambton Doors; EnviroDesign Series; www.lambtondoors.com. (Basis of Design)
2. Masonite: www.masonite.com.
3. VT Industries, Inc: www.vtindustries.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 DOORS

A. Doors: See drawings for locations and additional requirements.

1. Quality Standard: Premium Grade, Heavy Duty performance, in accordance with WDMA I.S. 1A.
2. Wood Veneer Faced Doors: 5-ply only. 7-ply and 9-ply face veneers are not acceptable.
3. High Pressure Decorative Laminate (HPDL) Faced Doors: 5-ply only. 7-ply and 9-ply face veneers are not acceptable.
4. All products of this Section shall be free of urea-formaldehyde.
5. Accessibility: Comply with ADA Standards and applicable state accessibility standards, as listed in Section 01 41 00 - Regulatory Requirements.
    a. Maximum Opening Force for Doors: comply with federal and state accessibility standards for door types and applications.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.

1. Provide solid core doors at each location.

2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is closed. Door panels shall meet UL 10C Category A with intumescent seal within door edge.
3. Wood veneer facing with factory transparent finish as indicated on drawings.
4. High pressure decorative laminate (HPDL) finish as indicated on drawings.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC-5), plies and faces as indicated above. Particle core to be Grade I-LD-2. High Density particle core, minimum density 32 pounds per cubic foot, allowed in lieu of blocking to achieve WDMA I.S. 1A Extra Heavy Duty performance.
   1. Non- rated doors with more than 40 percent of the door area removed for lites or louvers shall be SCLC (structural composite lumber core). These doors shall be fully warranted per the requirements of this Section.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking to provide adequate anchorage of hardware without through-bolting.
   1. Fire rated doors shall be Category A. Frame-applied intumescent is not acceptable.

2.04 DOOR FACINGS

A. Wood Veneer Facing for Transparent Finish: Premium White Maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with slip match between leaves of veneer, balance match of spliced veneer leaves assembled on door or panel face.
   1. Vertical Edges: Same species as face veneer.
   2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.

B. Facing Adhesive: Type I - waterproof, hot press system, formaldehyde free (NAF), or Ultra Low-Emitting Formaldehyde (ULEF).

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
   2. Provide solid blocking for other through bolted hardware.
   3. Staved lumber cores or hollow cores are not acceptable.

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

E. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

A. Finish work in accordance with WDMA I.S. 1A (F-1) PREMIUM (F-6) quality standard, and as follows:
   1. Transparent:
      a. System - TR-8, UV Cured Acrylated Polyester/Urethane.
      b. Stain: to match colors listed below, or as selected by Architect from manufacturer's full selection of standard and non-standard colors.
         1) Lambton Doors: PLS-101 Village Oak.
         2) Masonite:

3) VT Industries, Inc.:

c. Sheen: Satin.

B. Prior to finishing, doors shall be clean and dry with moisture content not to exceed eight percent average.

C. Factory finish doors in accordance with approved sample.

D. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

A. Glazing: See Section 08 80 00 - Glazing.

B. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws. Outside face of inset stops shall be set flush with face of door, with no gaps.

1. Glazing Stops for doors with 45 minute or higher fire rating: Provide manufacturer's flush profile veneer wrapped composite to match non-rated doors.

C. Door Hardware: See Section 08 71 00 - Door Hardware.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:

1. Carefully examine installation areas with Installer/ Applicator present, for compliance with requirements affecting work performance.

a. Verify that field measurements, surfaces, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are satisfactory and ready to receive work.

b. Verify that opening sizes and tolerances are acceptable.

c. Inspect all door frames and conditions before commencing installation of doors. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Flush wood doors shall be furnished to Section 06 20 00 - Finish Carpentry

B. Installation shall be in accordance with WDMA I.S. 1A J-1 requirements, manufacturer's instructions, approved submittals, specified quality standard, Drawings, and as follows:

1. Install doors with protective covering intact to protect doors during construction. Remove where required for installation of hardware and lite kits, or before final inspection.

2. Install fire-rated doors in accordance with NFPA 80 requirements.

3. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

4. Coordinate door undercuts with Door Schedule and Mechanical Drawings.

a. Provide maximum undercut allowed where indicated per NFPA 80 at fire rated doors.

C. Use machine tools to cut or drill for hardware.

1. All locks, exit devices, door closers, and other hardware shall be installed in accordance with the manufacturer's written instructions and NFPA 80 requirements.

2. Drill pilot holes of recommended size for wood screws required to fasten the hardware before screws are fastened into the wood door.

3. Shim hinges where required, to provide equal and proper clearance at each side of door. Hinge pilot holes to be drilled by manufacturer.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to WDMA I.S. 1A, P-3 and J-1, for:
   1. Fit and clearance tolerances.
   2. Limit of diagonal distortion.
   3. Telegraphing, warp, and squareness.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Site Tests, Inspection: Per Section 08 71 00 - Door Hardware, architectural hardware consultant to inspect each flush door in opening with Contractor and adjust to proper working order prior to Substantial Completion inspection.
C. Rehang doors that do not operate freely.
D. Remove, repair and reinstall or restore-in-place damaged items.
   1. Finish touch-up damaged surface finishes.
   2. Replace damaged materials or items with new if repair is not acceptable to Architect.

3.05 ADJUSTING

A. Adjust doors for smooth and balanced door movement.
B. Adjust closers for full closure.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.07 PROTECTION

A. Protect installed work from subsequent construction operations until date of Final Completion or Owner Occupancy, whichever occurs first.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Wall- and ceiling-mounted access door and frame units, non-rated and fire-rated.

B. Access doors required for purposes other than access to Fire Protection, Plumbing, HVAC, or Electrical Trade Contract work, and specifically shown on the Architectural Drawings shall be furnished by this Section for installation by Section 06 20 00 - Finish Carpentry.

C. Doors required to provide access to concealed valves, gauges, and other equipment related to Fire Protection, Plumbing, HVAC, and Electrical Trade Contract work shall be furnished by the respective Trade Contract to Section 06 20 00 - Finish Carpentry for installation. Trade Bidders shall furnish all access doors required by their work - whether doors are shown in the documents or not.

1.02 ABBREVIATIONS AND ACRONYMS

A. ITS. Intertek Testing Services: www.intertek.com.

B. UL. Underwriters Laboratories; www.ul.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ITS (DIR) - Directory of Listed Products.

C. UL (FRD) - Fire Resistance Directory.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
   2. Shop Drawings: Indicate exact position of each access door and/or panel unit.
   3. Manufacturer's Installation Instructions: Indicate installation requirements.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Pre-Consumer and Post-Consumer Recycled Content.

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Project Record Drawings: Record dimensioned locations of each unit installed on record drawings.

3. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination and the following:

B. Trade Contractors shall coordinate the location and size of required access panels with Sections 04 20 00 - Unit Masonry and Section 09 21 16 - Gypsum Board Assemblies to assure that rough openings are located appropriately.

C. Coordinate installation of access panels with Section 06 20 00 - Finish Carpentry.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations. See Section 01 60 00 - Product Requirements:

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these Specifications, provide products of one of the following:

1. Larsen's Manufacturing Company: www.larsensmfg.com.
2. Milcor by Commercial Products Group of Hart & Cooley, Inc.; Style M for Non-Fire-rated and Style UFR for insulated fire-rated: www.milcorinc.com
3. Nystrom Building Products: www.nystrom.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 WALL- AND CEILING-MOUNTED ACCESS UNITS

A. Wall- and Ceiling-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.

1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
2. Frames: 16-gauge, 0.0598-inch minimum thickness.
3. Heavy-Duty Single Steel Sheet Door Panels: 14-gauge, 0.0747-inch minimum thickness.

B. Units in Fire-Rated Assemblies: Fire rating to meet applicable code for fire-rated assembly that access doors are being installed.

1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
2. Provide products listed by ITS (DIR) or UL (FRD) as suitable for purpose indicated.
3. Rated door panels: 0.0359 inch double sheet with integral non-combustible insulation filler.
4. Door Style: Single thickness 16 gage minimum thickness, or double thickness hollow construction with insulation, required by fire rating.
5. Frames: 16 gage, 0.0598 inch, minimum.

C. Sizes:

1. Provide sizes as indicated or required by HVAC, Plumbing, Fire Protection, and Electrical sections of the Specifications, and distance from access door to item requiring access.
2. Walls: Minimum 16 by 16 inches, unless otherwise scheduled or acceptable to the Architect.
3. Ceilings: Minimum 16 by 16 inches, unless otherwise scheduled or acceptable to the Architect.

D. Hardware:

1. Hardware for Fire-Rated Units: To meet requirements for fire-rating of assembly in which access door or panel is located.
2. Hinges for Non-Fire-Rated Units: Continuous piano hinge.
3. Handle: No handle.

4. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
    a. All cylinder locks provided on access doors for the project shall be keyed the same.
5. Number of Locks/Latches Required: As recommended by manufacturer for size of unit.

E. Finish:
1. Access Door Units: Factory baked-on primer for field finish by Sections 09 91 13 - Exterior Painting and 09 91 23 - Interior Painting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00-Quality Requirements, and as follows:
1. Verify that opening field measurements, surfaces, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are satisfactory, and ready to receive work.
    a. Verify existing conditions before starting work.
    b. Verify that opening sizes and tolerances are acceptable.
2. Verify that rough openings are correctly sized and located.
3. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
4. Coordinate locations such that each access door and panel is installed within a single finish, and does not span joints between dissimilar finishes.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to proceeding with this work.
B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

A. Access Door and Frame Units furnished to Section 06 20 00-Finish Carpentry for installation in accordance with manufacturer's instructions, UL requirements, approved submittals, the Drawings, and as follows:
1. Install units in accordance with manufacturer's instructions.
2. Install frames plumb and level in openings, and secure units rigidly in place.
3. Position units to provide convenient access to concealed equipment when necessary.

3.04 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items.
1. Finish touch-up damaged surface finishes.
2. Replace damaged materials or items with new if repair is not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 08 33 26
OVERHEAD COILING GRILLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following overhead coiling grille work:
   1. Overhead coiling metal grilles and operating hardware; electrically operated.
   2. Wiring from electric circuit disconnect to operator and to control station.
   3. Accessories for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM International (ASTM): www.astm.org.
B. ITS. Intertek Testing Services NA, Inc.; www.intertek.com/directories/.
C. NEMA. The Association of Electrical and Medical Imaging Equipment Manufacturers; www.nema.org.
D. UL: Underwriters Laboratories; www.ul.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
E. ITS (DIR) - Directory of Listed Products.
F. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
G. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.
H. NEMA MG 00001 - Motors and Generators.
I. UL (DIR) - Online Certifications Directory.
J. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Provide general construction component connections and details, and electrical equipment.
   2. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, wiring diagrams, and installation details.
   3. Samples: Three grille sections, 4 by 8 inch in size illustrating shape, color and finish texture.
   4. Installer's qualification statement.
   5. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional

prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.

D. Closeout Submittals
1. Submit in accordance with the following:
    a. Section 01 70 00 - Execution and Closeout Requirements.
    b. Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.
3. Executed Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish system materials from one manufacturer for entire project unless otherwise acceptable to Architect.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations.
1. See Section 01 60 00 - Product Requirements.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements and submittal instructions.

B. Manufacturer Warranty: Provide manufacturer warranty for roller shaft counterbalance assembly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Grilles: Subject to compliance with these specifications, provide products of one of the following:
1. Cornell Iron Works, Inc: www.cornelliron.com.
2. Overhead Door Corporation; Upward Coiling Security Grilles – Model 671: www.overheaddoor.com. (Basis of Design)
3. Raynor Garage Doors: www.raynor.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 GRILLES AND COMPONENTS

A. Grille: Galvanized steel; horizontal bar curtain, coiling on overhead counterbalanced shaft.
1. Finish: Factory painted, color as selected by Architect from manufacturer's full range of standard and non-standard colors.
2. Lock Devices: Lock and latch handle on outside.
3. Electric operation.

4. Mounting: Within framed opening.

B. Curtain: Round horizontal bars connected with vertical links.
   1. Horizontal bars: 5/16 inch diameter.
   2. Bar spacing: 1-1/2 inch on center.
   3. Tube spacers: 1/2 inch diameter.
   4. Spacer spacing: 3-1/4 inch on center.
   5. Vertical links: 5/8 by 1/8 inch flat bar.
   6. Link spacing: 6 inch on center.
   7. Bar Ends: Provide with nylon runners for quiet operation.
   8. Bottom Bar: Back-to-back angles with tubular resilient cushion.

C. Guides: Extruded aluminum angles, of profile to retain grille in place with snap-on trim, mounting brackets of same metal.

D. Hood Enclosure and Trim: Sheet metal; completely covering operating mechanisms; internally reinforced to maintain rigidity and shape.
   1. Material: Galvanized steel, 24 gage, internally reinforced for rigidity.
   2. Finish: Factory painted, color as selected by Architect from manufacturer's full range of standard and non-standard colors.

E. Lock Hardware:
   1. Lock cylinders: specified in Section 08 71 00 - Door Hardware.
   2. For motor operated units, additional lock or latching mechanisms are not required.
   3. Latch Handle: Manufacturer's standard.

F. Roller Shaft Counterbalance: Steel pipe and torsion steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.03 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M).

B. Galvanized Steel Bars: Galvanized to minimum coating thickness grade in accordance with ASTM A123/A123M.

2.04 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
   1. Provide interlock switches on motor operated units.
   2. Provide tamperproof clear plastic cover, with a key, at the outside of overhead door operators at all grilles.

B. Electric Operators:
   1. Mounting: Side mounted.
   2. Motor Enclosure:
      a. Interior Coiling Grilles: NEMA MG 00001, Type 1; open drip proof.
   3. Motor Rating: 1/3 hp; continuous duty.
   4. Motor Voltage: 120 volts, single phase, 60 Hz.
   5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
   6. Controller Enclosure: NEMA EN 10250 Type 1.
   7. Opening Speed: 12 inches per second.
   8. Brake: Adjustable friction clutch type, activated by motor controller.
   9. Manual override in case of power failure.
   10. Refer to Section 26 00 10 for electrical connections.

C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at interior door jamb.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors with momentary-contact control device.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions shall be per Section 01 40 00 - Quality Requirements, and as follows:

B. Prior to starting work of this section carefully examine installation areas with installer present, for compliance with requirements affecting work performance.
   1. Verify that adjacent construction, surfaces, substrates, structural support, cleanliness, humidity, moisture content level, and other conditions are per requirements of the manufacturer, and suitable for door installation.
   2. Verify that electrical services have been installed and are accessible.
   3. Verify that door opening is plumb, header is level, and that dimensions and tolerances are correct.

C. Notify Architect of unacceptable conditions or varying dimensions.

D. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

A. Install grille unit assembly in accordance with drawings, approved submittals, manufacturer's instructions, and as follows:
   1. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
   2. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
   3. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
   4. Coordinate installation of electrical service with Section 26 00 10.
   5. Complete wiring from disconnect to unit components.
   6. Install enclosure and perimeter trim.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items.
   1. Finish touch-up damaged surface finishes.
   2. Replace damaged materials or items with new if repair is not acceptable to Architect.

3.05 ADJUSTING

A. Adjust grille, hardware and operating assemblies for smooth and noiseless operation.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean grille and components.
C. Remove labels and visible markings.

3.07 PROTECTION

A. Protect installed work from subsequent construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 08 34 53
BULLET RESISTANT ENTRY SYSTEMS

PART 1 - GENERAL

1.01 TRADE BIDDER REQUIRED

A. The work of this section is included in the Metal Windows Trade Bid. See Section 08 00 01 - Metal Windows Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricate, furnish, deliver, and install the following work:
   1. Bullet-resistant aluminum-framed entry doors and framing system, including manufacturer-supplied glazing.
   2. Accessories required for a complete installation, including but not limited to anchors and fasteners.

B. Products installed but not furnished under this Section:
   1. Section 08 71 00 - Door Hardware: Continuous hinges shall be furnished by door manufacturer; balance of hardware furnished by Section 08 71 00 - Door Hardware.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org

B. CAL (CDPH). California Department of Public Health; www.cdph.ca.gov

C. NIJ. National Institute of Justice; www.nij.gov

D. SCAQMD. South Coast Air Quality Management District; www.aqmd.gov

E. UL. Underwriters Laboratories; www.ul.com

1.04 REFERENCED STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

D. NIJ 0108.01 - Standard for Ballistic Resistant Protective Materials.

E. UL 752 - Standard for Bullet-Resisting Equipment.

1.05 SUBMITTALS

A. Construction Submittals
   1. Submit in accordance with Section 01 30 00 - Administrative Requirements.
      a. Shop Drawings: Indicate overall unit size, rough opening size, anchor spacing and location, and project-specific details of installation indicating relationship of window and counter systems to adjacent construction; specifically show the relationship of bullet resistant panels within the wall.
      b. Product literature: manufacturer's catalog information for the units specified. Indicate finishes and options selected, delivery and handling instructions, preparation, and storage instructions.
      c. Manufacturer's certification that the unit and glazing provide meets the listed ballistics grade requirements.
      d. Samples: submit the following:
         1) Frame sample: Submit three samples not less than 6 inches long each.
         2) Glazing: Submit three samples not less than 4 inches by 4 inches each.

B. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Metal Windows Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Pre-Consumer and Post-Consumer Recycled Content.
        2) Environmental Product Declarations (EPD).
        3) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
        4) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

C. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data:
    a. Manufacturer’s instructions for cleaning of glazing. All required submittals shall be approved prior to installation.

1.06 DELIVERY, STORAGE AND HANDLING

A. Delivery of the materials to the project with the manufacturer’s labels intact and legible. Handle the materials with care to prevent damage.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

C. Store materials inside and under cover, stack flat and off floor.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these specifications, provide products of one of the following:
1. Bullet Guard Corporation; www.bulletguard.com.
2. Armortex; www.armortex.com.
3. Protective Structures Ltd.; www.protectivestructures.com.
4. Total Security Solutions, Inc; www.tssbulletproof.com. (Basis of Design)
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 BULLET-RESISTANT STOREFRONT SYSTEM

A. Prefinished aluminum framing system with prefinished and preassembled aluminum and glass entry system. Overall dimensions of unit(s) and configuration(s) indicated on Drawings.

2.03 PERFORMANCE REQUIREMENTS

A. The bullet transaction window shall be of the “non-ricochet” type rated to Level 3 ballistics to resist a .44 magnum projectile per UL 752. This design is intended to permit the capture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

B. Transaction window glazing panels shall not be removable from threat side.

2.04 COMPONENTS

A. Framing
   1. Extruded aluminum alloy (6063 or 6061) type aluminum based on manufacturer's standard and complying with ASTM B209/B209M.
   2. Dimensions: 2 inches by 4 inches (nominal) by 1/8 min. (44mm by 102mm by 3mm) wall thickness or per requirements to achieve listed ballistic rating.
   3. Frame lined with ballistic fiberglass to the same rating as the glazing per manufacturer's standard details.
   4. Anchors and fasteners: Stainless steel.

B. Doors
   1. Extruded aluminum alloy (6063 or 6061) type aluminum based on manufacturer's standard and complying with ASTM B209/B209M.
   2. Dimensions:
      a. Bottom Rail: 10 inches.
      b. Side, Top, and intermediate rails: 5 inches (nominal).
      c. Thickness: 1-3/4 inches.
   3. Stile and Rail framing:
      a. Extruded 6061-T5 or T6 alloy / tempered aluminum with a UL 752 Level 3 protection rating.
      b. Thickness: 1/8 inch minimum.
      c. Dimensions: approximate sizes and profiles indicated on Drawings; consistent with "medium stile" design.
      d. Head and sill are one piece extrusions with no integral weep system at the sill. Jambs are two piece extrusions with removable faces to allow for re-glazing. Internal mullions are three piece extrusions.
      e. Frame to have no exposed fasteners. All joints and connections shall be tight, providing hairline points and true alignment of adjacent members.
      f. Panels shall be removable from the secure side of the glass.
      g. If required by manufacturer in order to achieve listed ballistic rating, provide bullet-resistant fiberglass packing within frame.
      h. Glazing components:
         1) Glazing setting blocks and glazing tape: manufacturer's standard.

C. Glazing Panels
   1. Glass-clad polycarbonate glazing meeting specified ballistic resistance and complying with NIJ 0108.01.
   2. Thickness: 1-1/4 inch.

D. Finish: Clear anodized aluminum.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to installing the bullet resistive material, the Metal Windows Trade Contractor shall verify that all supports have been installed per the requirements of the Contract Documents and Architectural Drawings, and approved shop drawings, if required.

B. Installer shall notify Architect of any unsatisfactory preparation that is responsibility of another installer.

C. Clean and prepare all surfaces per manufacturers recommendations for achieving the best results for the substrate under the project conditions.

3.02 INSTALLATION

A. Do not begin installation until openings have been verified and surfaces properly prepared in accordance with Drawings.

B. Install in accordance with manufacturer’s instructions and UL 752. Set all units level and plumb.

3.03 CLEANING

A. Clean product and accessories, removing all labels and protective covers.

B. Comply with Section 01 74 19 - Construction Waste Management and Disposal.

3.04 PROTECTION

A. Protect installed work from damage during subsequent construction operations until date of Substantial Completion or Owner's beneficial use of facility, whichever occurs first.

B. Touch-up and repair scratches or damage caused in shipping or handling of the products. Repair damaged units prior to completion and acceptance of the project or replace with new, per direction of Architect.

END OF SECTION

SECTION 08 34 73
SOUND CONTROL DOOR ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering and installing interior sound control door and frame assemblies as specified, as scheduled, and as shown on Contract Drawings.
   1. Provide acoustical door assemblies including doors, frames, and door hardware to include gasketing systems, retainers, retainer covers, automatic door bottoms, cam-lift hinges, thresholds, and sills, required to achieve specified performance requirements.

B. Accessories for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.

B. ASTM. ASTM International; www.astm.org.

C. BHMA. Builders Hardware Manufacturers Association: www.buildershardware.com.

D. HMMA. Hollow Metal Manufacturers Association.

E. NAAMM. National Association of Architectural Metal Manufacturers; www.naamm.org.

F. SDI. Steel Door Institute: www.steeldoor.org.

G. UL. Underwriters Laboratories; www.ul.com.

H. WDMA. Window and Door Manufacturers Association; www.wdma.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100).

C. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

D. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings.

E. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

F. ASTM E413 - Classification for Rating Sound Insulation.

G. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.

H. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames.

I. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames.

J. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames.

K. NAAMM HMMA 865 - Guide Specifications for Sound Control Hollow Metal Door and Frame Assemblies.

L. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.

M. UL 10B - Standard for Fire Tests of Door Assemblies.

N. WDMA I.S. 1A - Interior Architectural Wood Flush Doors.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

a. Indicate that maximum opening force for installed doors will comply with applicable federal and state codes and accessibiity standards.

2. Shop Drawings:
   a. Door frames: type, height, width, door frame thickness, gasketing and anchorage, and coordination with adjoining construction, including finishes on each side of door at jamb, head, and sill.
   b. Doors: type, height, width, thickness, core construction, swing, door lights and light kit installation.
   c. Finishes: Galvanizing and primer for metal doors; wood veneer species, grade, cut, match, and finish for wood doors.
3. Samples: For wood doors submit two sets of samples, 10 inch by 12 inch in size showing wood veneer species, grade, cut, match, and finish.
4. Test Reports:
   a. Certified laboratory reports, performed in accordance with ASTM E90 and ASTM E413, from independent testing laboratory qualified under National Voluntary Laboratory Accreditation Program (NVLAP) supporting compliance of assemblies to specified requirements.
   b. Minimum five field tests, performed in accordance with ASTM E336 and ASTM E413 by five separate independent testing agencies, substantiating acoustical performance when installed at no more than four FSTC ratings below the specified STC rating.
5. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
6. Installer's Qualification Statement.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
   a. Include documentation of:

D. Closeout Submittals
1. Operation and Maintenance Data: indicate maintenance procedures required to maintain warranty.
2. Certified statement of manufacturer's authorized representative, as specified in Field Quality Control
3. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

B. Testing Agency Qualifications: Independent testing agency accredited as an acoustical laboratory and certified to perform specified field testing.

C. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect metal doors in compliance with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) and specified requirements.

B. Protect wood doors in compliance with WDMA I.S. 1A and specified requirements.

C. Remove doors and frames from resilient packaging upon delivery on site and inspect for damage. Clean and touch-up scratches or disfigurement caused by shipping or handling promptly with rust inhibitive primer. Provide cover over doors for protection until installed, and store on planks or dunnage in a dry location, in vertical position properly braced with blocking to permit air circulation between components.

1.07 SCHEDULING

A. Furnish manufacturer's mounting templates for door hardware specified in Section 08 71 00 - Door Hardware to manufacturer of products of this Section in time for factory preparation for door hardware.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements and submittal instructions.

B. Repair or replace materials which prove to be defective in workmanship or material, within a period of five years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Sound Control Door Assemblies: Subject to compliance with these specifications, provide products of one of the following:

1. AMBICO Limited; Wood Sound Control Door and Steel Frame: www.ambico.com/#sle.
2. Overly Door Company: www.overly.com/#sle.
3. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 REGULATORY REQUIREMENTS

A. Accessibility: Comply with ADA Standards and applicable state accessibility standards, as listed in Section 01 41 00 - Regulatory Requirements .

1. Opening Force of Sound Control Doors: comply with federal and state accessibility standards for door types and applications.

B. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with specified requirements for each type; for instance, a sound control door is also indicated as being an exterior door must comply with requirements specified for sound control doors and exterior doors; where two requirements conflict, comply with most stringent.

D. Sound Transmission Coefficient rating STC as indicated on Drawings, for installed assembly, when tested as operable door assembly in accordance with ASTM E90 and ASTM E413.

E. Fire Labeled Doors and Frames: Construct in accordance with UL 10B and in accordance with Underwriters Laboratories or other recognized testing agency having a factory inspection service.

2.03 COMPONENTS

A. Provide acoustical assemblies complete with door, frame, anchors, sound seals, cam-lift hinges, and cutouts and reinforcements for hardware items listed or required.

B. Door Edge Profile: Manufacturer's standard for application indicated.
C. Glazed Lights: Factory installed, with removable stops on secure side; sizes and configurations as indicated on drawings.
   1. Style: Manufacturer's standard.
D. Acoustical material: Manufacturer's standard for required STC rating.

2.04 SOUND CONTROL DOORS

A. Construction:
   1. All doors shall be of the types, sizes, and STC ratings indicated on the Drawings.
   2. Hollow Metal Doors shall have an acoustical core with a core engineered to achieve the required STC rating.
   3. Wood doors shall be clad with three-ply crossband veneer for seven-ply door construction. All adhesives, as well as warp tolerances, shall be in accordance with WDMA I.S. 1A.
   4. Wood face veneers, stile and rail edges, and appearance features shall match doors approved under Section 08 14 16 - Flush Wood Doors.
   5. Finish is required on all exposed surfaces of door including top and bottom edges.
B. Hardware reinforcements: Doors shall be mortised and reinforced for fully templated hardware, only in accordance with the approved finish door hardware schedule and templates provided by the finish hardware subcontractor. Surface applied hardware are drilled on site by finish hardware subcontractor.

2.05 SOUND CONTROL DOOR FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
B. Materials:
   1. Frames shall be constructed of 14 gage minimum thickness commercial quality, level, cold rolled steel conforming to ASTM A1008/A1008M and free of scale, pitting or other surface defects.
C. Construction:
   1. Frames shall be fully welded units with integral trim, of sizes and shapes shown on Drawings. Knocked down frames will not be accepted. If field splices are required because of shipping limitations, such splices shall be field welded after installation.
   2. Corner joints shall have all contact edges closed tight, with trim faces mitered and continuously welded. The use of gusset will not be permitted.
D. Hardware reinforcements:
   1. Frames shall be mortised, reinforced, drilled and tapped frames for all templated hardware, only in accordance with final approved hardware schedule and templates provided by the finish hardware subcontractor. Where surface mounted hardware and non-templated mortised hardware is applied, frames shall be reinforced, with all drilling and tapping in the field by the finish hardware subcontractor.
E. Jamb anchors:
   1. Wall anchors to be fabricated of same material as frame material; weld anchors inside each jamb for wall anchorage.
   2. Provide anchor types for indicated wall construction:
      a. Frames for installation in masonry walls: adjustable jamb anchors, 16 gage, t-shape type.
      b. Frames for installation in stud partitions shall be provided with 16 gage steel zee anchors not more than 24 inches on center, welded inside each jamb.
F. Floor anchors:

1. Fabricate using the same material as frame material: 16 gage.
    a. Weld anchors inside each jamb for floor anchorage.

G. Plaster guards:
1. Fabricate from minimum 22 gage steel; weld in place at hardware mortises on frames to be set in masonry or concrete openings.

H. Provide welded frames with temporary spreader welded to jamb feet for bracing during shipping and handling. The steel spreader is not to be used for installation purposes.

I. All tool marks and surface imperfections shall be removed and exposed faces of all welded joints shall be dressed smooth.

2.06 DOOR HARDWARE

A. Supply gasketing systems, retainers, retainer covers, automatic door bottoms, cam-lift hinges, thresholds, and sills as specified in manufacturer's product data for project conditions, to achieve specified performance requirements.
1. Hinges: Cam lift type by door manufacturer; see Section 08 71 00.
2. Threshold: Provide sound control/acoustic seal for sill of door in closed position by door manufacturer.

2.07 SILL CONDITION

A. Where required to maintain the STC rating of the assembly, furnish a smooth stainless steel threshold for the door bottom to seal against, when the door is in the closed position. The minimum width of the threshold shall be door thickness plus 2 inches to allow the threshold to extend a minimum of 1 inch beyond the face of the door on both sides of the door.
1. For openings where carpet extends on each side of the opening, the threshold height shall be 1/8-inch greater in height than the carpet thickness.
2. Finished floor is defined as the top surface of the floor, except when resilient tile or carpet is used, when it is the top of the concrete slab.

PART 3 EXECUTION

3.01 EXAMINATION

A. It shall be the responsibility of the Construction Manager to perform the following:
1. Verify existing conditions before starting work.
    a. Verify that opening sizes and tolerances are acceptable.
    b. Verify that finished walls are in plane to ensure proper door alignment.
2. Installer's Examination:
    a. Installer to examine conditions under which construction activities of this Section are to be performed. Submit written notification to Construction Manager and Architect if such conditions are unacceptable.
    b. Beginning construction activities of this Section before unacceptable conditions have been corrected is prohibited.
    c. Beginning construction activities of this Section indicates installer's acceptance of conditions.

3.02 PREPARATION

A. Remove steel spreaders from welded frames prior to installation; use of spreaders for installation purposes not permitted.

3.03 INSTALLATION

A. Install units in accordance with approved shop drawings and manufacturer's printed installation instructions; in addition, install steel components in accordance with NAAMM HMMA 840.

B. Finish surfaces having abrasion damage. Smooth, touch up with rust inhibitive primer.

C. Coordinate frame anchor placement with wall construction.

D. Fill voids between concealed side of frame and adjacent wall construction with 6 to12 lb rock wool insulation or grout, in accordance with approved shop drawings, eliminating all voids, to assure minimum sound transmission.
E. Install gasketing systems, retainers, retainer covers, automatic door bottoms, cam-lift hinges, thresholds, and sills in accordance with manufacturer's printed instructions.
F. Installation of all other door hardware specified in Section 08 71 00 - Door Hardware.
G. Factory installed glazing, comply with installation requirements; see Section 08 80 00.
H. Field paint per Sections 09 91 13 - Exterior Painting and 09 91 23 - Interior Painting.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 865.
B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.
C. Squareness: Plus or minus 1/16 inch measured on a line, 90 degrees from one jamb, at the upper corner of the frame at the other jamb.
D. Alignment: Plus or minus 1/16 inch measured on jambs on a horizontal line parallel to the plane of the wall.
E. Twist: Plus or minus 1/16 inch measured at face corners of jamb on parallel lines perpendicular to the plane of the wall.
F. Plumb: Plus or minus 1/16 inch measured on the jamb at the floor.

3.05 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
    1. Replace damaged materials and components with new if repair not acceptable to Architect.
B. Engage and pay for field services of manufacturer's authorized representative to:
    1. Inspect completed installation of door and frame assemblies.
    2. Test all components through a minimum of ten complete cycles of operation.
    3. Verify each component is correctly installed.
    4. Direct installer in adjusting components for correct operation.
    5. Issue certified statement of compliance of installed door and frame assemblies to Architect.
    6. Instruct Owner's maintenance personnel in correct operation and maintenance procedures for components of door and frame assemblies.

3.06 ADJUSTING

A. Adjust for smooth and balanced sound control door movement.
B. Adjust closers for full closure.
C. Adjust sound control doors so that seals are fully engaged when door is closed.
D. Adjust sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

3.07 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.

3.08 PROTECTION

A. Protect installed work from subsequent construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 08 36 13
SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Overhead sectional doors, electrically operated.
   2. Operating hardware and supports.
   3. Electrical controls for sectional doors.
   4. Accessories required for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.
B. ASTM. ASTM International; www.astm.org.
C. CARB. California Air Resources Board; www.arb.ca.gov.
D. CDPH: California Department of Health; www.cdph.ca.gov.
E. DASMA. Door and Access Systems Manufacturers Association; www.dasma.com.
F. FSC. Forest Stewardship Council; us.fsc.org.
G. ITS. Intertek; www.intertek.com.
H. NEMA. National Electrical Manufacturer's Association; www.nema.org.
I. NFPA. National Fire Protection Association; www.nfpa.org.
J. UL. Underwriters Laboratories Inc.; www.ul.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ANSI / DASMA 105 - Test Method for Thermal Transmittance and Air Infiltration of Garage Doors.
C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
E. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
F. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
G. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.
H. DASMA 102 - American National Standard Specifications for Sectional Doors.
I. FSC - Forest Stewardship Council.
J. ITS (DIR) - Directory of Listed Products.
K. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.
L. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
M. NFPA 70 - National Electrical Code.
N. UL (DIR) - Online Certifications Directory.
O. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
   2. Product Data: Show component construction, anchorage method, and hardware.
   3. Samples: Two panel finish samples, 6 by 6 inches in size, illustrating color and finish.
   4. Installer's qualification statement.
   5. Test data on thermal performance and air leakage.
   6. Specimen warranties.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) FSC-certified wood products.
         2) Environmental Product Declarations (EPD).
         3) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.
         4) Ultra Low-Emitting Formaldehyde (ULEF) or No Added Formaldehyde (NAF) in plywood, and other sheet or composite wood products compliant with CARB (ATCM) limits.

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Operation Data: Include normal operation, troubleshooting, and adjusting.
   3. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
   4. Warranties: Submit manufacturer warranties and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

B. Comply with applicable code for motor and motor control requirements.

C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

D. Doors shall meet applicable energy code requirements for thermal transmittance and air leakage.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for warranty requirements.

B. Extended Correction Period: Correct defective work within a 2-year period commencing on Date of Substantial Completion.

C. Provide manufacturer's ten year warranty, minimum, on skin delamination and rust-through.

D. Provide manufacturer's two year warranty, miminum, for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors: Subject to compliance with these specifications, provide products of one of the following:
   1. Overhead Door Corporation; 596 Series Thermacore Insulated Steel Doors:: www.overheaddoor.com.
   2. Raynor Garage Doors; ThermalSeal, Model TM-200: www.raynor.com.
   3. Wayne-Dalton, a Division of Overhead Door Corporation; ThermoMark 5200: www.wayne-dalton.com. (Basis of Design)
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE REQUIREMENTS

A. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

B. Performance: Provide door systems that can withstand the ultimate wind speed of 140 mph or greater. This includes tracks, panels and glazed openings.

2.03 STEEL DOORS

A. Steel Doors: Flush steel, insulated; low headroom and standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
   1. Door Panels: Steel construction with thermal break; outer steel sheet of 28 gauge, 0.015 inch minimum thickness, flush profile; inner steel sheet of 20 gauge, 0.0359 inch minimum thickness, flat profile; sheet steel roll formed with two 1-3/4 inch integral struts sealed with polypropylene caps per section; polyurethane insulation.
      a. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
      b. Thermal values: R-value of 16.22 minimum.
      c. Air Infiltration: Maximum 0.23 at 1.57 psf / 25 mph or as measured at standard test pressure of 15 mph per ANSI / DASMA 105.
   2. Door Nominal Thickness: 2 inches thick.
   3. Exterior Finish:
      a. Factory finished with two-coat silicone polyester; color as selected by Architect from manufacturer's full range of custom and standard colors.
   4. Interior Finish:
      a. Factory finished with two-coat polyester baked enamel; color as selected by Architect from manufacturer's full range of custom and standard colors.
   5. Glazed Lites: Full panel width, number of rows as indicated on Dramings; set in place with resilient glazing channel.
      a. Glazing: Fully tempered glass; single pane; clear; 1/2 inch nominal overall thickness.
   6. Electric Operation: Electric control station.

2.04 COMPONENTS

A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
   1. See drawings for track lift orientation.
      a. OH-1: Standard lift.
      b. OH-2: High lift.

B. Sill Weatherstripping: Manufacturer's standard meeting air infiltration requirements.

C. Jamb Weatherstripping: Manufacturer's standard meeting air infiltration requirements.
D. Head Weatherstripping: Manufacturer's standard meeting air infiltration requirements.
E. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
F. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.
G. Lock Cylinders: See Section 08 71 00 - Door Hardware.

2.05 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
B. Aluminum Extrusions for Vision Panels: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
C. Fully tempered glass: comply with ASTM C1048.
D. Insulation: Foamed-in-place polyurethane, bonded to facing.

2.06 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
   1. Provide interlock switches on motor operated units.
B. Electric Operators:
   1. Mounting: Side mounted on cross head shaft.
   2. Motor Rating: Required hp based on size and weight of door; manually operable in case of power failure, transit speed of 12 inches per second.
   3. Motor Voltage: 208 volts, three phase, 60 Hz.
   4. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
   5. Controller Enclosure: NEMA EN 10250, Type 1.
   6. Opening Speed: 12 inches per second.
   7. Brake: Adjustable friction clutch type, activated by motor controller.
   8. Manual override in case of power failure.
C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at interior door jamb.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
   4. Overhead doors to controlled by long-range card reader at door, and by remote operation from interior space served by door. Exact location of controls to be determined by Architect.
E. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.
F. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening.
   1. Photoelectric Sensor: provide two sets of sensors per overhead sectional door; manufacturer's standard self-monitoring system designed to detect an obstruction in door

opening without contact between door and obstruction and stop and reverse downward door travel. Mounting heights of both sets of sensors to be verified with Owner and Architect.

G. Limit Switches: provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

H. Warning Lights: Provide warning lights with red and green traffic signals at each overhead door.

1. Annunciator lights to be furnished and installed on the wall by overhead door company for connection of electrical power / control wiring by the electrical subcontractor.

I. Timer to Close: When door reaches fully open position, timer automatically closes door after a preset time of one second to 15 minutes, includes pull cord activation switch. Open button, safety edge, or stop button will rest timer.

J. Radio Control Antenna Detector: Provide exterior antenna to enhance radio control reception - doors to operate from a distance of 50 feet from the building.

K. Exterior Key Switch: Provide Knox-type key switch at one overhead door. Knox model 3502.

L. Hand Held Transmitter: Digital control, and resettable. Provide three button radio transmitter to provide remote open, close, stop functionality. Provide two transmitters per door.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

C. Verify overhead clearances at each door - determine requirements for standard clearance or low clearance tracks based on field dimensions.

3.02 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.03 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 92 00 - Joint Sealants.

G. Install perimeter trim.

3.04 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch.

B. Maximum Variation from Level: 1/16 inch.

C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly to ensure conformance with tested energy and air leakage performance.

3.06 CLEANING

A. Comply with Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean doors and frames and glazing.
C. Remove temporary labels and visible markings.

3.07 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.
B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section is included in the Metal Windows Trade Bid. See Section 08 00 01 - Metal Windows Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing as specified, as scheduled, and as shown in the contract drawings, the following:
   1. Interior aluminum-framed storefront; with vision glazing as specified by Section 08 80 00 - Glazing.
   2. Exterior aluminum-framed storefront, with vision glazing and infill panels.
   3. Interior aluminum doors; vision glazing as specified by Section 08 80 00 - Glazing.
   4. Exterior aluminum doors with vision glass.
   5. Glass and glazing within storefront framing and door vision panels: as specified by Section 08 80 00 - Glazing.
      a. Factory glazing shall be required at all glazing types, except that field glazing shall be acceptable for locations for which Security Glazing is specified.
   6. Weatherstripping and astragal seals integral to doors and opening framing.
   7. Accessories required for a complete, warrantable installation.
   8. Provision and installation of sealants at locations that will be inaccessible to the Waterproofing, Dampproofing, and Caulking Trade Contractor once storefront is installed, including, but not limited to sealant beds placed under door sills or storefront sill framing.

B. Products Installed But Not Furnished Under This Section:
   1. Section 08 71 00 - Door Hardware.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association; www.aamanet.org
B. ASTM. ASTM International; www.astm.org
C. CDPH. California Department of Health; www.cdph.ca.gov.
D. SSPC. The Society for Protective Coatings; www.sspc.org/standards/scopes.html.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
C. ADA Standards - 2010 ADA Standards for Accessible Design.
D. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
E. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

J. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

K. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

L. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights.

M. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

N. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).

1.05 ADMINISTRATIVE REQUIREMENTS

A. Refer to Section 01 30 00 - Administrative Requirements, and the following:

B. Coordination per Section 01 31 14 - Coordination, and as follows:

1. The Metal Windows Trade Contractor shall fully coordinate the work of this Section with the following related sections:
    a. Section 04 20 00 - Unit Masonry.
    b. Section 08 44 13 - Glazed Aluminum Curtain Walls.
    c. Section 08 51 13 - Aluminum Windows.
    d. Section 08 71 00 - Door Hardware.
    e. Section 09 21 16 - Gypsum Board Assemblies.

C. Preinstallation Meetings: See Section 01 70 00 - Execution and Closeout Requirements.

D. Provide for manufacturer representation to conduct pre-installation site meeting.

E. Coordinate with installation of other components of adjacent construction.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals:

1. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details, weather stripping gaskets, installation instructions, use limitations and recommendations, and sample warranties applicable to this Section.
2. Shop Drawings: Submit drawings for review indicating location in plan and elevation, components with material types and description, sizes and dimensions including rough opening, frame and extrusion, methods of joining, details of all field connections and anchorage, fastening and sealing methods, and metal finishes. Indicate interior and exterior, and locations of stops.
    a. Details of field connections shall be specific to this project, and reflect the actual configuration of adjacent construction and materials. Generic manufacturer catalog details are not permissible as shop drawings and will be rejected without review.
3. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
4. Samples: Submit three representative samples of storefront and door: metal, fasteners, anchors, frame sections, mullion section, and corner section, for approval. In addition, provide three samples of each specified color on aluminum.
5. Test and Evaluation Reports: Provide test reports from accredited laboratories certifying the performance as specified.

a. Test reports shall be accompanied by the window manufacturer’s letter of certification, stating the tested window meets or exceeds the referenced criteria for the appropriate storefront type.

6. Installer's qualification statement.
7. Specimen warranty.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Metal Windows Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
a. Include documentation of:
1) Post-Consumer and Pre-Consumer Recycled Content.
2) Environmental Product Declarations (EPD).
3) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
4) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranty, executed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish storefront system materials, including window and aluminum door and frame products installed in storefront from one manufacturer for entire Project, unless otherwise acceptable to Architect.

1.08 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.
1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10, manufacturer instructions and recommendations, and Section 01 60 00 - Product Requirements.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 WARRANTY

A. Special Warranty: Prepare and submit warranties in accordance with Section 01 78 00 - Closeout Submittals.
1. Storefront System Warranty: Trade Contractor shall assume full responsibility and warrant for three years the satisfactory performance of the total storefront installation. This includes but is not limited to, glass, glazing, doors and hardware, anchorage and setting system, sealing, flashing as it relates to air, water, and structural adequacy as called for by the drawings, specifications, and approved submittals.

a. Deficiencies due to such elements not meeting the requirements of the specifications shall be corrected.

2. Finish Warranty: Provide manufacturer warranty against excessive degradation of exterior finish based on specified AAMA requirements for a period of not less than 20 years. Warranty shall be signed by manufacturer and state that the paint system provided meets the requirements and description of the AAMA standard specified. Include provision for replacement of units if fading exceeds a 5-E color difference, cracking, peeling, chalking, or flaking.
3. Glass Warranty Period: Refer to requirements in Section 08 80 00 - Glazing.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum-Framed Storefronts: Subject to compliance with these specifications, provide products of one of the following:
1. EFCO, an Apogee Architectural Metals company; www.apogeearchmetals.com. (Basis of Design)
a. Product for interior applications: EFCO 402.
b. Product for exterior applications: EFCO 403X.
2. Kawneer North America: www.kawneer.com.
3. Oldcastle Building Envelope: www.oldcastlebe.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 ALUMINUM-FRAMED STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
1. Glazing Rabbet: For 1/4 inch monolithic glazing, for interior applications.
2. Glazing Rabbet: For 1-1/4 inch security glazing.
3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced to support imposed loads.
4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.

a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

2. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing Stops: Flush.

B. Interior Swing Doors: Glazed aluminum, wide stile entrance door system from same manufacturer as storefront and curtain wall systems.
   1. Basis of Design: EFCO Corp.; D500/D502 Series or other acceptable product from manufacturers listed above.
   2. Dimensions: the following dimensions are nominal, and may vary slightly by manufacturer:
      a. Thickness: Refer to Drawings.
   3. Top Rail: 5 inches wide.
   4. Vertical Stiles: 5 inches wide.
      a. Bottom Rail: 10 inches wide.
      b. Cross Rail: As indicated in Drawings.
   5. Glazing Stops: Square, 0.05 inches think. Provide non-removable stops on non-secure side.
   6. Corners shall be welded construction.
   7. Stile and Rail framing shall be 0.125 inches thick.
   8. Finish: Same as storefront.
   9. Provide EPDM glazing gaskets and glazing blocks and stops appropriate to glass thickness.
   10. Accessibility: Comply with ADA Standards and applicable state accessibility standards, as listed in Section 01 41 00 - Regulatory Requirements.
      a. Maximum Opening Force for Doors: comply with federal and state accessibility standards for door types and applications.

C. Exterior Swing Doors: Glazed aluminum, wide stile thermally broken entrance door system from same manufacturer as storefront and curtain wall systems.
   1. Basis of Design: EFCO Corp.; D502 Series or other acceptable product from manufacturers listed above.
   2. Dimensions: the following dimensions are nominal, and may vary slightly by manufacturer:
      a. Thickness: Refer to Drawings.
      b. Top Rail: As indicated in Drawings, or if not indicated, 5 inches wide.
      c. Vertical Stiles: As indicated in Drawings, or if not indicated, 5 inches wide.
      d. Bottom Rail: As indicated in Drawings, or if not indicated, 10 inches wide.
      e. Cross Rail: As indicated in Drawings.
   3. Glazing Stops: Square, 0.05 inches think. Provide non-removable stops on non-secure side.
   4. Corners shall be welded construction.
   5. Performance: U-value less than or equal to 0.77.
      a. Performance testing per NFRC winter condition.
   6. Stile and Rail framing shall be 0.125 inches thick.
   7. Finish: High performance organic coating; to match storefront finish.
   8. Provide EPDM glazing gaskets and glazing blocks and stops appropriate to glass thickness.

9. Accessibility: Comply with ADA Standards and applicable state accessibility standards, as listed in Section 01 41 00 - Regulatory Requirements.
    a. Maximum Opening Force for Doors: comply with federal and state accessibility standards for door types and applications.

D. Operable Sash: Aluminum project-in hopper; finished to match storefront; turn handle latch with manufacturer's standard insect screen.

2.04 MATERIALS

A. Extruded Aluminum: Shall be 6063-T6 alloy and temper per ASTM B221 (ASTM B221M).

B. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

C. Fasteners: Stainless steel.

D. Exposed Flashings and Closure Pieces: Aluminum sheet, 20 gauge, 0.032 inch minimum thickness; factory formed to profiles needed; finish to match framing members.

E. Fasteners: All exposed fasteners shall be aluminum or stainless steel.

F. Perimeter Sealant: As specified in Section 07 92 00 - Joint Sealants.

G. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

H. Glazing Accessories: See Section 08 80 00 - Glazing.

I. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

J. Dissimilar Metals: All dissimilar metals shall be properly isolated to prevent galvanic action.

2.05 FINISHES

A. Interior: High Performance Organic Coating: AAMA 2604; multiple coats, thermally cured fluoropolymer system.

B. Exterior:Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

C. Color: As selected by Architect from manufacturer's full and custom range.

D. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.06 HARDWARE

A. Door Hardware: As specified in Section 08 71 00 - Door Hardware, with the following exceptions:.
    1. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
    2. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

2.07 FABRICATION

A. General:
    1. All aluminum frame extrusions shall have a minimum wall thickness of 0.080 inch (2 mm).
    2. All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.
    3. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
    4. Accurately fit and secure joints and corners. Make joints flush, with hairline tolerance.
    5. Prepare components to receive anchor devices. Fabricate anchors.
    6. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
    7. Arrange fasteners and attachments to conceal from view.
    8. Reinforce components internally for door hardware and door operators.

9. Reinforce framing members for imposed loads.
10. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
    a. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

B. Frame: Frame components shall be center glazed screw spline construction.

C. Glazing: All units shall be “dry glazed" with recyclable EPDM gasket on both exterior and interior, unless specifically indicated otherwise.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:

B. Carefully examine openings and installation areas with Installer present, for compliance with requirements affecting work performance.
   1. Verify that field measurements, surfaces, substrates, structural anchoring support, tolerances, levelness, plumbness, cleanliness and other conditions are satisfactory and ready to receive work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install using only skilled tradespeople to install in accordance with ASTM E2112, manufacturer’s instructions, recommendations, approved submittals, the Drawings, and as follows:
   1. Storefront system shall be erected plumb and true, in proper alignment and relation to established lines and grades.
   2. Entrance doors shall be securely anchored in place to a straight, plumb, and level condition, without distortion and free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
      a. Hardware movement shall be checked and final adjustments made for proper operation and performance of units.
   3. Furnish and apply sealing materials where embedded behind or under storefront framing members or door sills, or wherever sealant installation must occur simultaneous with framing installation due to sequence of installation.
      a. Provide sealing materials as specified in Section 07 92 00 - Joint Sealants and manufacturer's requirements.
      b. Sealing materials specified shall be used in strict accordance with the manufacturer‘s printed instructions, and shall be applied only by mechanics specially trained or experienced in their use.
         1) All surfaces must be clean and free of foreign matter before applying sealing materials.
         2) Sealing compounds shall be tooled to fill the joint and provide a smooth finished surface.
         3) For sealants exposed to view, prevent fresh sealant exposure to dust, dirt, and debris before skin-over and curing.
   4. Install operating sash.
   5. Install hardware using templates provided.
   6. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 FIELD QUALITY CONTROL

A. Inspect to verify that each storefront system is dimensionally within allowable tolerances, plumb, level, clean, with a solid anchoring surface, optimal operating components, and is in accordance with approved shop drawings.

B. The Architectural Hardware Consultant will evaluate each storefront door in opening with Construction Manager and recommend adjustments to assure proper working order prior to Substantial Completion inspection.

1. Adjust doors for smooth and balanced door movement.
2. Rehang doors that do not operate freely.
3. Adjust closers for full closure.

C. Remove, repair and reinstall or restore-in-place damaged items.

1. Finish touch-up damaged surface finishes.
2. Replace damaged material components or whole units with new if repair not acceptable to Owner or Architect.

3.04 ADJUSTING

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

B. Adjust operable doors to a smooth operational performance and ease of latching.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Remove protective material from pre-finished aluminum surfaces.

3.06 PROTECTION

A. Protect installed work from damage during subsequent construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section is included in the Metal Windows Trade Bid. See Section 08 00 01 - Metal Windows Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Designing, fabricating, furnishing, delivering, erecting and installing the following glazed aluminum curtain wall systems, complete with related components as shown on drawings and specified in this section including, but not limited to:
   1. Aluminum-framed curtain wall, with vision glazing and glass and metal infill panels.
   2. Glass and glazing as specified in Section 08 80 00 - Glazing.
      a. Factory glazing shall be required at all glazing types, except that field glazing shall be acceptable for locations for which SchoolGuard glazing is specified.
   3. Aluminum entrance doors with or without vision glass in curtain wall systems.
   4. Weatherstripping and astragal seals integral to doors and opening framing.
   5. Spray-applied foam insulation within curtain wall metal closures, as shown on drawings.
   6. Perimeter sealant and backing materials as specified in Section 07 92 00 - Joint Sealants at primary weather seal, and sealants embedded or concealed by subsequent installation of curtainwall framing.
   7. Accessories required for a complete, warrantable installation.

B. Products Installed but Not Furnished Under This Section:
   1. Section 08 71 00 - Door Hardware.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association; www.aamanet.org.
B. ANSI: American National Standards Institute; www.ansi.org.
C. ASTM. ASTM International; www.astm.org
D. CAL (CDPH). California Department of Health; www.cdph.ca.gov.
E. FLA (FBC). Florida Building Code; www.floridabuilding.org.
F. SDI. Steel Door Institute: www.steeldoor.org.
G. SSPC. The Society for Protective Coatings; www.sspc.org/standards/scopes.html.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
C. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies for Protection of Building Envelopes.
D. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
E. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
F. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
G. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

H. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
I. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
J. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
K. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
N. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
O. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
P. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
Q. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
R. FBC TAS 201 - Impact Test Procedures; Testing Application Standard.
S. FBC TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard.
T. FBC TAS 203 - Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard.
U. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure:
   1. See Section 01 31 14 - Coordination.
   2. The Metal Windows Trade Contractor shall fully coordinate the work of this section with installation of other components that comprise the exterior enclosure, including but not limited to the following related sections:
      a. Section 08 43 13 - Aluminum-Framed Storefronts.
      b. Section 08 51 13 - Aluminum Windows.
      c. Section 08 71 00 - Door Hardware.
      d. Section 08 80 00 - Glazing.
B. Preinstallation Meeting: Conduct a preinstallation meeting before starting work of this section; require attendance by all affected installers.
   1. See Section 01 70 00 - Execution and Closeout Requirements.
   2. Provide for manufacturer representation to conduct pre-installation site meeting.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Provide manufacturer's product data, component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details,

weatherstripping gaskets, glazing infill,, installation instructions, use limitations, and protection recommendations.

2. Shop Drawings: Submit drawings for review indicating location in plan and elevation. Indicate system dimensions, framed or masonry opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and connections to structure including field welding required. Indicate interior and exterior, and locations of stops.
    a. Details of field connections shall be specific to this project and reflect the actual configuration of adjacent construction and materials. Generic manufacturer catalog details are not permissible as shop drawings and will be rejected without review.
    b. Hardware Rough-ins: Include information in submittals documenting coordination of hardware rough-in locations and mounting heights within aluminum door systems.
3. Samples: Submit three representative samples of curtain wall finished aluminum surfaces, glazing, infill panels, and glazing materials, fasteners, anchors, frame sections, mullion section, and corner section, for approval.
    a. In addition, provide three samples of each specified color on aluminum.
4. Manufacturer's Certification: Certify that the products supplied meet or exceed the specified performance requirements and applicable state and local energy code requirements.
5. Design Data: Provide framing member structural and physical characteristics and engineering calculations based on wind loads, importance factor, exposure type and height. Identify dimensional limitations; include load calculations at points of attachment to building structure, as prepared by a professional structural engineer licensed in Massachusetts.
    a. Submit manufacturer’s design engineering data documenting that the products proposed meet specified and code-required wind-borne debris testing requirements for all door configurations and specified hardware. Engineer shall be certified in Massachusetts, or by the State of Florida if Florida testing will be used as basis of conformance.
        1) Indicate on assembly testing diagrams the door and hardware configurations proposed, where multiple options exist.
        2) Where products are proposed for use that are not those listed in tested assemblies, submit manufacturer’s or design engineer’s certification stating that the products are equivalent to those listed in tested assemblies, and are eligible for substitution under applicable testing limitations.
6. Test and Evaluation Reports: Provide test reports from accredited laboratories certifying the performance as specified.
    a. Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.
    b. Structural Glazing Adhesive: Submit product data and calculations showing compliance with performance requirements.
    c. Test reports shall be accompanied by the curtain wall manufacturer’s letter of certification stating that the tested curtain wall meets or exceeds the referenced criteria for the appropriate curtain wall type.
7. Field Quality Control Submittals:
    a. Curtain wall manufacturer's representative's field report.
    b. Report of field testing for water leakage and air leakage.
8. Designer's Qualification Statement.
9. Certification that curtain wall meets or exceeds specified requirements.
10. Installer's Qualification Statement.
11. Specimen warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Metal Windows Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.
         2) Environmental Product Declarations (EPD) and Health Product Declarations (HPD).
         3) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
         4) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.
   2. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Massachusetts.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

C. Single Source Responsibility: Furnish system materials from one manufacturer for entire Project, unless otherwise acceptable to Architect.

D. Regulatory Requirements:
   1. See Section 01 41 00 - Regulatory Requirements.
   2. Meet or exceed requirements of Massachusetts Specialized Municipal Opt-in Code.

E. See Section 01 91 19 - Building Envelope Commissioning and Section _____ for requirements associated with building envelope commissioning applicable to this section.

1.08 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building and includes work of this section.
   1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements.

B. Handle products of this section in accordance with manufacturer's instructions and recommendations, and in compliance with AAMA CW-10.

C. Mark products with shop drawing location references, using removable tags or concealed markings, unless already properly marked.

D. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or spray coatings that bond to aluminum when exposed to sunlight or weather.

1.10 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.
   1. Do not install sealant when moisture is present, it is windy, or when such conditions are threatening.

1.11 WARRANTY

A. Special Warranty:
   1. Prepare and submit warranties in accordance with Section 01 78 00 - Closeout Submittals.
   2. Curtain Wall System Warranty: Metal Windows Trade Contractor shall assume full responsibility and warrant for three years the satisfactory performance of the total curtain wall installation. This includes but is not limited to glass (including insulated units), glazing, operating hardware, anchorage and setting system, sealing, and flashing, as it relates to air, water, and structural adequacy as called for by the drawings, specifications, and approved submittals.
   3. Glass and Glazing Warranty: See Section 08 80 00 - Glazing.
   4. Finish Warranty: Provide manufacturer warranty against excessive degradation of exterior finish, based on AAMA 2605. Include provision for replacement of units with excessive fading, chalking, or flaking.
      a. Warranty Period: Correct defective work within 20-year period commencing after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glazed Aluminum Curtain Walls Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. EFCO, an Apogee Architectural Metals company; XTherm 5600 Series with Duracast Fiberglass Pressure plate: www.apogeearchmetals.com. (Basis of Design)
   2. Kawneer North America; 1600UT with fiberglass pressure plate: www.kawneer.com.
   3. Oldcastle Building Envelope; Reliance TC with FRP vertical and horizontal pressure plate: www.oldcastlebe.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Fabrication: Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced to support imposed loads.
   2. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   3. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   4. Maintain continuous air barrier and/or vapor retarder seal throughout assembly, primarily in line with inside pane of glazing and heel bead of glazing compound.
   5. Frame gages and construction shall meet wind-borne debris impact testing requirements, non-thermally broken type.

a. Include door seal components where integral to frame when indicated in tested assembly details.

B. Laboratory Test Units:
1. Air, water, structural, and thermal test unit sizes shall be as recommended by NFRC. Thermal test shall include one intermediate vertical mullion and two lites of glass.

C. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
1. Design Wind Loads: Comply with wind loads indicated on structural drawings.
a. Provide engineering of all of the framing sizes and the attachment of the system to the building.
2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
a. Expansion and contraction caused by 180 degrees F surface temperature.
b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
c. Movement of curtain wall relative to perimeter framing.
d. Deflection of structural support framing, under permanent and dynamic loads.

D. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
1. Test Pressure Differential: 10 psf.

E. Air Leakage: 0.06 cfm/sq ft maximum leakage of wall area when tested in accordance with ASTM E283/E283M at 6.24 psf pressure difference across assembly.

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Cross-Section: 2-1/2 inch nominal width by depths indicated, or deeper, to meet wind load.
2. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.

B. Glazing: Outside glazed. Glazing type(s) as specified in Section 08 80 00 - Glazing .

C. Infill Panels: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed, with insulated backpan.
1. Face Sheet: 0.032 inch thick.
2. Core: Glass fiber insulation core with R-value of 3.55.
3. Back Sheet: 0.032 inch thick.
4. Exterior Finish: Class I natural anodized.

D. Exterior and Interior Doors: Glazed aluminum, wide style thermally broken entrance door system from same manufacturer as storefront and curtain wall systems.
1. Products: Subject to compliance with these specifications, provide products of one of the following:
a. Kawneer North America; Exterior - 500T Series, Interior - 500 Series.
b. EFCO; Exterior - D502 Series, Interior D500 Series. (Basis of Design)
c. Oldcastle Building Envelope; Exterior - WS375, Interior - WS500.
d. Tubelite, Inc.; Exterior Standard Entrance Wide Stile, Interior Standard Wide Entrance door.
e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2. Dimensions: the following dimensions are nominal, and may vary slightly by manufacturer:
   a. Thickness: 2 inches.
   b. Top Rail: 5 inches wide.
   c. Vertical Stiles: 5 inches wide.
   d. Bottom Rail: 10 inches wide.
   e. Cross Rail: 8 inches wide (nominal.)
3. Glazing Stops: Square, 0.05 inches think. Provide non-removable stops at non-secure side.
4. Corners shall be welded construction.
5. Exterior Door Performance: U-value less than or equal to 0.77.
   a. Performance testing per NFRC winter condition.
6. Stile and Rail framing shall be 0.125 inches thick.
7. Provide EPDM glazing gaskets and glazing blocks and stops appropriate to glass thickness.
8. Door panel gages and construction shall meet wind-borne debris impact testing requirements with specified core material.
   a. Swinging door panels shall meet the requirements of applicable state and local codes and ANSI/SDI A250.13, ASTM E1886, ASTM E1996, FBC TAS 201, FBC TAS 202, and FBC TAS 203.

E. Operable Concealed Curtain Wall Vents:
   1. Operable vent opening limiters: mechanical limiters to prevent operable sashes from opening to more than 4 inches clear along the opening edge opposite the hinge side.

2.04 MATERIALS

A. Extruded Aluminum: Shall be 6063-T6 alloy and temper per ASTM B221 (ASTM B221M).
B. Sheet Aluminum: ASTM B209/B209M.
C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.
D. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.
E. Frame anchors for wind-borne debris impact openings: type selected by Metal Windows Trade Contractor and included in design engineering or details of tested assemblies. The construction document details are diagrammatic and do not dictate the frame anchor type, size, spacing, or gage of anchors, or details of substrate conditions required to meet tested assembly requirements: the Metal Windows Trade Contractor shall coordinate all conditions and materials required to conform with submitted assembly testing results. Exposed fasteners at faces of frames will not be accepted.
F. Provide frame weatherstripping components, factory installed to frames, when included in manufacturer’s tested assembly details for wind-borne debris impact testing.
G. Exposed Fasteners: Stainless steel; type applicable to substrate and recommended by curtain wall manufacturer.
H. Exposed Flashings: Aluminum sheet, 20-gauge, 0.032-inch minimum thickness; finish to match framing members.
I. Perimeter Sealant: See Section 07 92 00 - Joint Sealants.
J. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
K. Glazing Accessories: See Section 08 80 00 - Glazing.
L. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.
M. Dissimilar Metals: All dissimilar metals shall be properly isolated to prevent galvanic action.
N. Silicone Transition Strips: Subject to compliance with these specifications, provide products of one of the following:

1. Dow Corning; Silicone Transition strip and transition membrane system; www.dowcorning.com. (Basis of Design)
2. Endurit; GTS 160; www.bessern.com.
3. Tremco; PRO-Glaze ETA; www.tremcosealants.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.05 FINISHES

A. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

B. Interior: High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system.

C. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

D. Exterior: Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.

E. Color for Aluminum Framing: To be selected by Architect from manufacturer's full standard and custom range.

F. Color for Aluminum Doors: To be selected by Architect from manufacturer's full standard and custom range.

G. Factory finish surfaces that will be exposed in completed assemblies.

H. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

I. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.06 FABRICATION

A. All aluminum vertical and horizontal extrusions shall have a minimum wall thickness of 0.093 inch to 0.125 inch.

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 3-1/4 inch.

D. All frame and vent members shall be able to accommodate separate interior and exterior finishes and colors.

E. Fabricate components with minimum clearances and shim spacing around perimeter of assembly yet enabling installation and dynamic movement of perimeter seal.

F. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

G. Prepare components to receive anchor devices. Fabricate anchors.

H. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

I. Arrange fasteners and attachments to conceal from view.

J. Reinforce framing members for imposed loads.

K. Glazing: Outside glazed curtain wall system shall be dry-glazed with an exterior aluminum pressure plate and snap cover with interior and exterior dense EPDM preset gaskets.

L. Miter and corner block vent frame.
   1. Vents shall be zero site line configuration.

PART 3 EXECUTION

3.01 EXAMINATION

A. See Section 01 40 00 - Quality Requirements.
B. Carefully examine openings and installation areas with installer/applicator present, for compliance with requirements affecting work performance.
   1. Verify field measurements, tolerances. surfaces, substrates, tolerances, levelness, plumbness, cleanliness and other conditions are satisfactory and ready to receive work.
   2. Verify that curtain wall openings and adjoining water-resistive and air barrier seal materials are ready to receive work of this section.
   3. Verify that structural anchorage devices have been properly installed and located.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install curtain wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Install openings that are required to meet wind-borne debris impact requirements in accordance with design engineering and/or details of tested assemblies.
D. Provide alignment attachments and shims to permanently fasten system to building structure.
E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
F. Provide thermal isolation where components penetrate or disrupt building insulation.
G. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
I. Install operating sash.
J. Pressure Plate Framing: Install glazing in accordance with Section 08 80 00 - Glazing, using exterior dry glazing method.
K. Install perimeter sealant in accordance with Section 07 92 00 - Joint Sealants.
   1. For sealants exposed to view, prevent fresh sealant exposure to dust, dirt, and debris before skin-over and curing.
L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet noncumulative or 0.5 inches per 100 feet, whichever is less.
B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Inspect to verify that each curtain wall unit is dimensionally within allowable tolerances, plumb, level, clean, with a solid anchoring surface, optimal operating components, and is in accordance with approved shop drawings.
C. Building envelope commissioning is included on this project. Field testing performed by Owner 's testing agency and building Commissioning Agent will include not less than 10 percent of openings or minimum of two units, and will be performed in accordance with 01 91 19 - Building

Envelope Commissioning and AAMA 501.2 for water leakage spray test, or AAMA 503 for pressurized air infiltration and water resistance test.

1. The Construction Manager shall provide site-constructed temporary testing boxes for pressurized testing at no cost to the project.
2. Openings to be tested will be sampled at the beginning, middle, and near the end of the construction process.
3. All units that fail testing will be retested at the Metal Windows Trade Contractor's expense.

D. Provide services of curtain wall manufacturer's field representative to observe for proper installation of system and submit report.

E. Repair or replace curtain wall components that have failed designated field testing, and retest to verify performance complies with specified requirements.

F. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.

1. Finish touch-up damaged surface finishes.
2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.05 ADJUSTING

A. Adequately anchor work to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

B. Adjust operating sash for smooth operation.

3.06 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

C. Remove protective material from pre-finished aluminum surfaces.

D. Remove excess sealant by method acceptable to sealant manufacturer, and that meets applicable VOC regulations and LEED requirements: see Section 01 81 13 - Sustainable Design Requirements.

E. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with manufacturer's instructions and AAMA 609 & 610.

3.07 PROTECTION

A. Protect installed work from damage until subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 08 44 35
FIRE-RATED GLAZED ASSEMBLIES

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section is included in the Metal Windows Trade Bid. See Section 08 00 01 - Metal Windows Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing Exterior Fire-Rated Curtain Wall System complete with related components for a watertight assembly, as shown on drawings and specified in this Section including, but not limited to:
   1. Exterior protective framed glazing assembly.
   2. Exterior doors within fire-rated glazing systems.
   3. Interior protective framed glazing assembly.
   4. Perimeter sealant.
   5. Accessories required for a complete, warrantable installation.

B. Products Installed But Not Furnished Under This Section:
   1. Section 08 71 00 - Door Hardware.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA: Previously American Architectural Manufacturers Association, now Fenestration & Glazing Industry Alliance (FGIA); www.fgiaonline.org.

B. ASCE: American Society of Civil Engineers; www.asce.org.

C. ASTM: ASTM International; www.astm.org.

D. CARB: California Air Resource Boar; www.arb.ca.gov.

E. CDPH: California Department of Health; www.cdph.ca.gov.

F. ITS: Intertek; www.intertek.com.

G. NFPA: National Fire Protection Association; www.nfpa.org.

H. SSPC: The Association for Materials Protection and Performance (AMPP), formerly the Society for Protective Coatings; www.ampp.org.

I. UL: Underwriters Laboratories Inc.; www.ul.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.

C. AAMA 501.4 - Recommended Static Test Method for Evaluating Window Wall, Curtain Wall and Storefront Systems Subjected to Seismic and Wind-Induced Inter-Story Drift.

D. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.

E. AAMA 611 - Specification for Anodized Architectural Aluminum.

F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

G. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

H. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

I. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

J. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
K. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
L. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
M. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
N. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
O. ITS (DIR) - Directory of Listed Products.
P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
Q. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).
R. UL (DIR) - Online Certifications Directory.
S. UL 263 - Standard for Fire Tests of Building Construction and Materials.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.
B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this Section; require attendance by all affected installers.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data: Provide evidence of compliance with fire performance criteria and manufacturer's published product data on framing components, glazing, anchorage and fasteners, and doors, if any.
    2. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
    3. Samples: Submit samples as follows illustrating each exposed metal finish of interior and exterior project-specific applications.
        a. For color anodized aluminum, submit minimum of three samples illustrating expected range of color in actual production.
        b. For factory-finished steel members, submit minimum of three color selection samples.
    4. Design Data: Submit framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.
    5. Test Reports: Submit results of full-size mock-up testing for criteria other than fire performance. Reports of tests previously performed on the same design are acceptable.
    6. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
    7. Field Quality Control Submittals: Submit report of field testing for water leakage.
    8. Designer's Qualification Statement.
    9. Installer's Qualification Statement.
C. Sustainability Submittals
    1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Metal Windows Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Environmental Product Declarations (EPD).

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a professional structural engineer experienced in design of this work and licensed at Massachusetts.

B. Refer to Sections 01 91 13 General Commissioning Requirements, 07 08 00 Thermal and Moisture Protection Systems Commissioning, and 08 08 00 Openings Systems Commissioning for requirements association with building envelope commissioning applicable to this Section.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.08 MOCK-UPS

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building, and includes work of this section.
1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.09 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F, and maintain above this minimum temperature during and for 48 hours after installation.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a three year period after date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 EXTERIOR PROTECTIVE FRAMED GLAZING ASSEMBLIES

A. Provide factory fabricated, factory finished framing members with glazing and related flashings, anchorage and attachment devices.
1. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" within internal spaces.
2. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
3. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.

4. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Fire Performance: Provide hourly fire-resistance-rating as indicated; tested as an assembly including glazing in compliance with ASTM E119 or UL 263 and requirements of local authorities having jurisdiction.
   1. Exterior Wall Fire-Rating: 60 minutes.
   2. Fire-Rating of Doors: 60 minutes.
   3. Acceptable evidence of compliance includes listing by UL (DIR), ITS (DIR), or testing agency acceptable to authorities having jurisdiction.

C. Structural Performance: Design and size components to withstand the following loading without damage or permanent set.
   1. Design Live Loads: Comply with wind loads indicated in the structural drawings.
      a. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths or 3/4 inch, whichever is less, under specified design load.
   4. Seismic Loads: Design and size components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
   5. Interstory Differential Lateral Movement: Meeting pass/fail criteria of AAMA 501.4 for Use Group I, Standard Occupancy, when tested at design displacement of 0.010 times greater adjacent story height, maximum, and 1.5 times design displacement, through three complete cycles.
   6. Movement: Accommodate the following movement without damage to components or deterioration of seals:
      a. Expansion and contraction caused by 180 degrees F surface temperature.
      b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
      c. Movement of wall relative to perimeter framing.
      d. Deflection of structural support framing, under permanent and dynamic loads.

D. Water Penetration: No uncontrolled water on indoor face when tested as follows:
   1. Test Pressure Differential: 10 pound-force per square foot.

E. Air Leakage: 0.06 cfm/sq ft maximum leakage of wall area when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.

F. Thermal Performance:
   1. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
   2. Overall U-value Including Glazing: U-0.38, maximum.

2.02 INTERIOR PROTECTIVE FRAMED GLAZING ASSEMBLIES

A. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. SAFTIFIRST, a division of O'Keeffe's Inc; GPX Architectural Series with fire resistive doors: www.safti.com.

2. Technical Glass Products; Fireframes SG Curtainwall Serieswith Fireframes Designer Series doors: www.fireglass.com.
3. Vetrotech North America; VDS 60 Framing System: www.vetrotechusa.com. (Basis of Design)
4. Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.

B. Provide factory fabricated, factory finished framing members with glazing and related flashings, anchorage and attachment devices.

C. Fire Performance: Provide hourly fire-resistance-rating as indicated; tested as an assembly including glazing in compliance with ASTM E119 or UL 263 and requirements of local authorities having jurisdiction.
   1. Acceptable evidence of compliance includes listing by UL (DIR), ITS (DIR), or testing agency acceptable to authorities having jurisdiction.

2.03 COMPONENTS

A. Framing Members: Formed steel structural members with aluminum cladding and non-combustible thermally-resistive material to meet requirements for fire rating.
   1. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced suitably for imposed loads.
   2. Glazing Stops: Flush.
   3. Cross-Section: As indicated on drawings.
   4. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

C. Structural Supporting Anchors: See Section 05 12 00 - Structural Steel Framing.

D. Fasteners: Stainless steel.
   1. Arrange fasteners and attachments to conceal from view.

E. Exposed Flashings: 20 gauge, 0.032 inch thick aluminum sheet; finish to match framing members.

F. Concealed Flashings: 26-gauge, 0.018 inch thick galvanized steel.

G. Firestopping: As specified in Section 07 84 00 - Firestopping.

H. Sealants Within Fire-Rated Assembly: per requirements of fire-rating and manufacturer's assembly.

I. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.

J. Sealant for Setting Thresholds: Non-curing butyl type.

K. Sealants: See Section 07 92 00 for additional information.

L. Perimeter Sealant: As specified in Section 07 92 00 - Joint Sealants.

M. Glazing Gaskets: Type to suit application to achieve fire-rating, weather, moisture, and air infiltration requirements.

N. Shop and Touch-Up Primer for Steel Components: Zinc oxide, alkyd, linseed oil primer appropriate for use over hand cleaned steel.

O. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.05 DOORS AND HARDWARE

A. Doors: Glazed hollow steel.
   1. Type: Manual swinging.
   2. Product: Subject to compliance with these specifications, provide products of one of the following:
      a. Vetrotech; VDS 60 Doors.
      b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   3. Thickness: 2-9/16 inches.
   4. Top Rail: 3-9/16 inches wide.
   5. Vertical Stiles: 3-9/16 inches wide.
   6. Bottom Rail: 10 inches wide.
   7. Glazing Stops: Square.
   8. Finish: Same as framing.

B. Door Hardware:
   1. Types: As specified in Section 08 71 00 - Door Hardware.
   2. Finish on Hand-Contacted Items: Satin stainless steel.

2.06 FINISHES

A. Finishing: Apply factory finish to surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural metal surfaces are visible in completed assemblies, including joint edges.

B. Aluminum Finish: Class I dark bronze coating.
   1. Apply factory finish to surfaces that will be exposed in completed assemblies.
   2. Touch-up surfaces cut during fabrication so that no natural aluminum metal surfaces are visible in completed assemblies, including joint edges.
   3. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

C. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick.

D. Interior Steel Finish:
   1. 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.
      a. Color and Gloss: As selected by Architect from manufacturer's full range.

E. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

A. Install wall system in accordance with limitations of fire rating and with manufacturer's instructions.

B. Install framed glazing assemblies in accordance with NFPA 80 and requirements of local authorities having jurisdiction.

C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
D. Provide alignment attachments and shims to permanently fasten system to building structure.
E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
F. Provide thermal isolation where components penetrate or disrupt building insulation.
G. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
I. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
J. Install firestopping at each floor slab edge.
K. Set door thresholds in bed of mastic and secure.
L. Install door hardware using templates provided.
    1. See Section 08 71 00 - Door Hardware for hardware installation requirements.
M. Install perimeter sealant in accordance with Section 07 92 00 - Joint Sealants.
N. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch every 3 feet non-cumulative or 1/2 inch per 100 ft, whichever is less.
B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
C. Sealant Space Between Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. Provide services of manufacturer's field representative to observe installation and submit report.
B. See Section 01 40 00 - Quality Requirements for general testing and inspection requirements.
C. Building Envelope Commissioning is included on this project. Testing performed by Owner's testing agency will include not less than 10 percent of openings or minimum of two units, and be performed in accordance with Building Envelope Commissioning Requirements section and AAMA 501.2 for Water Leakage spray test, or AAMA 503 for pressurized Air Infiltration and Water Resistance test.
    1. The Construction Manager shall provide site-constructed temporary testing boxes for pressurized testing at no cost to the project.
    2. Openings to be tested will be sampled at the beginning, middle, and near the end of the construction process.
    3. All units that fail testing will be retested at the Metal Windows Trade Contractor's expense.

3.05 ADJUSTING

A. Adjust doors for smooth operation.

3.06 CLEANING

A. Remove protective material from pre-finished surfaces.
B. Wash down 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.
C. Remove excess sealant by method acceptable to sealant manufacturer.

3.07 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section is included in the Metal Windows Trade Bid. See Section 08 00 01 - Metal Windows Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Designing, fabricating, furnishing, delivering, erecting and installing the following glazed aluminum curtain wall systems, complete with related components as shown on drawings and specified in this section including, but not limited to:
   1. Extruded aluminum windows with fixed sash and operating sash.
   2. Factory glazing shall be required at all glazing types, except that field glazing shall be acceptable for locations for which SchoolGuard glazing is specified: See Section 08 80 00 - Glazing.
   3. Operating hardware.
   4. Insect screens.
   5. Aluminum window shades, as shown on drawings.
   6. Accessories required for a complete, warrantable installation.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association; www.aamanet.org.
B. ASTM. ASTM International; www.astm.org.
C. CDPH. California Department of Public Health; www.cdph.ca.gov.
D. CSA. CSA Group: www.csagroup.org.
E. NFRC. National Fenestration Rating Council; www.nfrc.org.
F. WDMA. Window and Door Manufacturers Association; www.wdma.com.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.
C. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
D. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
E. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
F. AAMA 910 - Voluntary “Life Cycle” Specifications and Test Methods for AW Class Architectural Windows and Doors.
G. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
H. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
I. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
J. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
K. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
N. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
O. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
P. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
Q. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
R. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
S. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
T. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights.
U. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
V. FBC TAS 201 - Impact Test Procedures; Testing Application Standard.
W. FBC TAS 202 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure; Testing Application Standard.
X. FBC TAS 203 - Criteria for Testing Products Subject To Cyclic Wind Pressure Loading; Testing Application Standard.
Y. NFRC 100 - Procedure for Determining Fenestration Product U-factors.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination shall be per Section 01 31 14 - Coordination and with the following:
    1. Section 08 71 00 - Door Hardware.
    2. Section 08 80 00 - Glazing.
B. Preinstallation Meeting: Convene one week before starting work of this section. Require attendance by all affected installers.
    1. See Section 01 70 00 - Execution and Closeout Requirements.
    2. Provide manufacturer representation to conduct pre-installation site meeting.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data: Include component dimensions, information on glass and glazing, internal drainage details, descriptions of hardware and accessories, and use limitations.
    2. Shop Drawings:
        a. The window supplier shall arrange for, pay for, and provide project-specific shop drawings representing all conditions in the project.
            1) Failure to provide project-specific details will result in forfeiture of retainage as back-charge for services not performed, the value of which shall be determined by Owner.

2) Generic manufacturer catalog details are not permissible as shop drawings and will be rejected without review.

b. Indicate window locations in plan and elevation, components with material types and descriptions, sizes and dimensions including frames and extrusions, opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, methods of joining, details and locations of all field connections and anchorage, fastening and sealing methods, metal finishes, affected related work, and installation requirements.

c. Details of field connections shall be specific to this project and reflect the actual configuration of windows within and in relation to this project's applicable exterior wall systems, construction, and materials.

d. Schedule window types using the same or similar codes as used in the design documents.

3. Samples:
   a. Prototype Sample Unit: Provide 36 inch by 24 inch single unit sample window assembly with operating hardware, representing in all respects the minimum quality of work to be furnished by the manufacturer, for review and approval prior to fabrication production.
   b. Operating Hardware: Three samples of each type and finish.
4. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
   a. Evidence of AAMA Certification.
   b. Evidence of WDMA Certification.
   c. Evidence of CSA Certification.
   d. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
5. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.
   a. Test reports shall be accompanied by the window manufacturer’s letter of certification, stating the tested window meets or exceeds the referenced criteria for the window type.
6. Manufacturer's Certification: Certify that aluminum windows meet or exceed specified requirements and applicable state and local energy code requirements..
7. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
8. Installer's qualification statement.
9. Specimen warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Metal Windows Trade Contractor shall provide all documentation indicating applicability of products of this section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.
         2) Environmental Product Declarations (EPD).

3) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
4) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
1. Submit in accordance with the following:
a. Section 01 70 00 - Execution and Closeout Requirements.
b. Section 01 78 00 - Closeout Submittals.
2. Test and Evaluation Reports: Report of field testing for water leakage and air penetration.
3. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.
B. Single Source Responsibility: Furnish system materials from one manufacturer for the entire Project, unless otherwise acceptable to Architect.
C. Regulatory Requirements:
1. See Section 01 41 00 - Regulatory Requirements.
2. Meet or exceed requirements of Massachusetts Specialized Municipal Opt-in Code.
D. See Section 01 91 13 - MEP Commissioning Requirements and Section 01 91 19 - Building Envelope Commissioning for requirements associated with building envelope commissioning applicable to this section.

1.08 MOCK-UP

A. The project scope includes a freestanding mock-up assembly representative of the exterior envelope of the building and includes work of this section.
1. See Section 01 40 00 - Quality Requirements for exterior envelope mock-up requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations and Section 01 60 00 - Product Requirements.
B. Comply with requirements of AAMA CW-10.
C. Mark window units with shop drawing location reference, using removable tags or concealed markings, unless already properly marked.
D. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.10 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.
B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.11 WARRANTY

A. Special Warranty:
1. Prepare and submit warranties in accordance with Section 01 78 00 - Closeout Submittals.
2. Window System Warranty: Metal Windows Trade Contractor shall assume full responsibility and warrant the satisfactory performance of the total aluminum window installation. This shall include the glass (including insulated units), glazing, operating hardware, anchorage and setting system, sealing, and flashing, as it relates to air, water, and structural adequacy as called for by the drawings, specifications, and approved submittals.

a. Warranty Period: Correct defective work within a three year period after date of Substantial Completion.

3. Glass and Glazing Warranty: See Section 08 80 00 - Glazing.
4. Finish Warranty: Provide manufacturer warranty against excessive degradation of exterior finish based on AAMA 2605. Include provision for replacement of units with excessive fading, chalking, or flaking.
   a. Warranty Period: Correct defective work within a 20 year period after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum Window Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. EFCO, a Pella Company; X-Therm 325X: www.efcocorp.com (Basis of Design)
   2. Graham Architectural Products; GT6800; www.grahamwindows.com.
   3. Kawneer Company, Inc; AA 4325; www.kawneer.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 ALUMINUM WINDOWS

A. Aluminum Windows: Extruded single thickness aluminum frame and sash, factory fabricated, factory finished, thermally broken, with vision glass, operating hardware, related flashings, and anchorage and attachment devices.
   1. Frame Depth: 3-1/4 inch.
   2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced for operating hardware and imposed loads.
   3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
   5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   6. Thermal Movement: Design to accommodate thermal movement caused by 180 degrees F surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.
   7. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly.

B. Fixed, Non-Operable Type:
   1. Construction: Thermally broken.
   2. Glazing: Double; clear; low-e, consistent with products defined in Section 08 80 00 - Glazing.
   3. Exterior Finish: AAMA 2605 Superior performing organic coatings. See FINISHES paragraph below.
   4. Interior Finish: AAMA 2604 High performance organic coatings. See FINISHES paragraph below.

C. Outswinging Awning Type:
   1. Construction: Thermally broken.

2. Provide screens.
3. Glazing: Triple; clear; low-e, consistent with products defined in Section 08 80 00 - Glazing.
4. Exterior Finish: AAMA 2605 Superior performing organic coatings.
5. Interior Finish: AAMA 2604 High performance organic coatings.

2.03 PERFORMANCE REQUIREMENTS

A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type.
   1. Performance Class (PC): AW.
B. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.
C. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 for Wind Zone ___ - Enhanced Protection for Large and Small Missile impact and pressure cycling at design wind pressure.
D. Water Infiltration Test Pressure Differential: 15 pounds per square foot.
E. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 12.11 psf.
F. Air Leakage: 0.1 cfm/sq ft maximum leakage per unit area of outside window frame dimension when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.
G. Mullions: Design to meet wind loading conditions indicated on Structural Drawings.
H. Thermal Movement: Resists thermal movement caused by 180 degrees F surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.
I. Condensation Resistance Factor of Frame: .55, measured in accordance with AAMA 1503.
J. Overall Thermal Transmittance (U-value): .38 maximum for fixed units and .45 maximum for operable units, including glazing, measured on window sizes required for this project. Values are per NFRC 100, winter condition, gateway size.
K. SHGC value: per Section 08 80 00 - Glazing.
L. Life Cycle Requirements: No damage to fasteners, hardware parts or other components that would render operable windows inoperable, and no reduction in air and water infiltration resistance when tested according to AAMA 910.
M. Design, fabrication, furnishing, and installation of exterior doors and frames with or without glazed vision panels and fixed sidelights and/or transom panels, as indicated in drawings, meeting testing requirements of ASTM E1886 and ASTM E1996 or State of Florida FBC TAS 201, FBC TAS 202, FBC TAS 203 for wind-borne debris impacts.

2.04 COMPONENTS

A. Frames: 3-1/4 inch wide by 2-5/8 inch deep profile of 1/8 inch minimum thickness section; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of screw fastened type.
B. Glazing: See Section 08 80 00 - Glazing.
C. Sills: 1/4 inch thick, extruded aluminum; sloped for positive wash; fit under sash leg to 1/2 inch beyond wall face; one piece full width of opening; jamb angles to terminate sill end.
D. Insect Screens: Extruded aluminum frame of rectangular sections, with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools. Nominal size similar to operable glazed unit.
   1. Hardware: Spring loaded steel pins; four per screen unit.
   2. Screen Mesh: 14/18 mesh, aluminum strands.
   3. Frame Finish: Same as frame and sash.
E. Aluminum Window Shades:

1. Extruded aluminum window shades shall be designed as an integral part of the aluminum window system, and shall be by same manufacturer as for the aluminum windows.
2. Anchors: Perimeter and floor line anchors shall be aluminum or steel. Dissimilar metals shall be properly isolated.
3. Aluminum horizontal extrusions (blades):
   a. Minimum wall thickness of .063 inches to .125 inches.
   b. Mechanically fastened by means of extruded aluminum screw splines.
4. Sunshade "arms" and mullino clips shall be extrusions with a nominal wall thickness of .25 inches.
5. Finish: Multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin.
6. Color: To be selected by Architect from manufacturer's full range of standard and custom colors.
7. Basis of Design Product: EFCO E-Shade Exterior Sun Control Devices: www.efcocorp.com.
   a. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

F. Operable Sash Weatherstripping: Nylon pile; permanently resilient, profiled to achieve effective weather seal.
G. Fasteners: Stainless steel.
H. Glazing Materials: See Section 08 80 00 - Glazing.
I. Sealants and Backing Materials:
   1. See Section 07 92 00 for additional requirements.

2.05 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
B. Sheet Aluminum: ASTM B209/B209M, 5005 alloy, H12 or H14 temper.
C. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A123/A123M.

2.06 HARDWARE

A. Sash lock: Cam lock.
B. Operator: Lever action handle fitted to projecting sash arms with limit stops.
   1. Number of Operators per Sash: Per manufacturer's recommendations for sash width.
C. Limit Stops: Resilient rubber.
D. Hinges: Butt style.
   1. Operating Awning Hinge: Four-bar stainless steel arm or equal. Provide limit stop to restrict hinge travel and limit vent opening.

2.07 FINISHES

A. Interior: High Performance Organic Coatings: AAMA 2604; multiple-coat, thermally cured fluoropolymer system.
B. Exterior: Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
C. Finish Colors: As selected by Architect from manufacturer's full range of standard and custom colors. Project may use multiple colors.
D. Factory-finish surfaces that will be exposed in completed assemblies.

E. Touch-Up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
F. Apply two coats of bituminous coating to concealed metal surfaces in contact with cementitious or dissimilar materials.
G. Touch-Up Primer for Galvanized Steel Surfaces: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions shall be per Section 01 40 00 - Quality Requirements and as follows:
   1. Carefully examine openings and installation areas with installer present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, rough openings, surfaces, substrates, structural anchoring support, air and vapor seal, tolerances, levelness, plumbness, cleanliness, and other conditions are per manufacturer requirements, and ready to receive work.
   2. Verify that wall openings and adjoining water-resistive barrier materials are ready to receive aluminum windows; see Section 07 27 00 - Vapor Retarder / Air Infiltration Barriers.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PRIME WINDOW INSTALLATION

A. Install windows in accordance with manufacturer's instructions.
B. Install windows in accordance with ASTM E2112.
C. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
D. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
E. Install sill.
F. 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.
G. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.
H. Install operating hardware not pre-installed by manufacturer.
I. Install glass and glazing in accordance with requirements; See Section 08 80 00 - Glazing.
J. Install perimeter sealant in accordance with requirements specified in Section 07 92 00 - Joint Sealants.
   1. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.
   2. For sealants exposed to view, prevent fresh sealant exposure to dust, dirt, and debris before skin-over and curing.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

A. Provide services of aluminum window manufacturer's field representative to observe for proper installation of system and submit report.
B. See Section 01 40 00 - Quality Requirements for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.

C. Inspect to verify that each window is dimensionally within allowable tolerances, plumb, level, clean, with a solid anchoring surface, optimal operating components, and is in accordance with approved Shop Drawings.

D. Building envelope commissioning is included on this project. Field testing of installed aluminum windows by Owner 's testing agent and building Commissioning Agent will be performed in accordance with Section 01 91 19 - Building Envelope Commissioning , AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.
   1. Perform tests on not less than 10 percent of units or minimum of two units of each type, in designated locations as indicated on drawings.
   2. Units to be tested will be sampled at the beginning, middle, and near the end of the construction process.
   3. Field test for water penetration in accordance with ASTM E1105 using Procedure A - uniform for AW windows static air pressure difference; test pressure shall not be less than 1.9 psf.
   4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf.

E. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

F. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Finish touch-up damaged surface finishes.
   2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.05 ADJUSTING

A. Adequately anchor units to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

B. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Comply with requirements of 01 74 19 - Construction Waste Management and Disposal.

C. Remove protective material from factory finished aluminum surfaces.

D. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

E. Remove excess glazing sealant by method acceptable to sealant and window manufacturer, and that meets applicable VOC regulations and LEED requirements: see Section 01 81 13 - Sustainable Design Requirements.

3.07 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 08 56 53
SECURITY WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricate, furnish, deliver, and install the following work:
   1. Fixed bullet-resistant windows for installation on the interior side of exterior aluminum window units and exterior curtain wall, including manufacturer-supplied glazing for field installation.

B. Accessories required for a complete installation, including but not limited to anchors and fasteners.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.

B. CDPH. California Department of Public Health; www.cdph.ca.gov.

C. UL. UL Solutions; www.ul.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. AAMA 611 - Specification for Anodized Architectural Aluminum.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

F. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

G. UL 752 - Standard for Bullet-Resisting Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Furnish anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, to be embedded into concrete or masonry, with setting diagrams and installation, to applicable installer in time for installation.

B. Preinstallation Meeting: Prior to start of installation arrange a meeting on site to familiarize installer and installers of related work with requirements relating to this work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Manufacturer's published data for the units specified and options selected, showing materials, construction details, dimensions of components, and finishes.
   2. Shop Drawings:
      a. The window supplier shall arrange for, pay for, and provide project-specific shop drawings representing all conditions in the project.
      b. Failure to provide project-specific details will result in forfeiture of retainage as back-charge for services not performed, the value of which shall be determined by the Owner.
      c. Generic manufacturer catalog details are not permissible as shop drawings and will be rejected without review.

d. Indicate window locations in plan and elevation, components with material types and descriptions, sizes and dimensions including frames and extrusions, opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, methods of joining, details and locations of all field connections and anchorage, fastening and sealing methods, metal finishes, affected related work, and installation requirements.
e. Details of field connections shall be specific to this project, and reflect the actual configuration of windows within and in relation to this project's applicable exterior wall systems, construction, and materials.

3. Product literature: manufacturer's catalog information for the units specified. Indicate finishes and options selected, delivery and handling instructions.
4. Samples:
   a. Actual sections of frame members: submit three samples at least 6 inch long, showing finish, weatherstripping, and fasteners.
   b. Glazing: Submit three samples not less than 4 inches by 4 inches each.
5. Coordination Drawings:
   a. For each window opening, show locations and details of items necessary to anchor windows that must be installed by others, in sufficient detail that installer of those items can do so correctly without reference to the actual window itself.
6. Installer's Qualification Statement.
7. Specimen warranty.
8. For Tool-Resisting Steel Bars: Material certificates indicating compliance with entire specified test method.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements, including documentation and reporting requirements for each credit, pertain to this specification Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Metal Windows Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator for submission to www.leedonline.com. Refer to 01 81 13 - Sustainable Design Requirements for additional requirements.
3. Submit required information using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form for applicable LEED for Schools v4/v4.1 credits: Refer to Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for project's credit goals.
   a. Include documentation of:
      1) Post-Consumer and Pre-Consumer Recycled Content.
      2) Environmental Product Declarations (EPD).
      3) Health Product Declarations (HPD).
      4) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
      5) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
1. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

a. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1) See Section 01 60 00 - Product Requirements for additional provisions.
   2) Extra Security Fasteners: At least one box for every 50 boxes, or fraction thereof, of each type and size installed; provide products matching those installed, packaged and labeled.
   3) Tool Kit: Two sets of tools for security fasteners.

1.06 QUALITY ASSURANCE

1. Testing Agency Qualifications: Independent testing agency able to show experience in conducting tests of the type specified and:
   a. Qualified according to ASTM E329 for testing tool-resisting steel.
2. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
3. Single Source Responsibility: Provide windows from a single manufacturer.

1.07 DELIVERY, STORAGE AND HANDLING

1. Deliver materials to the project with the manufacturer’s labels intact and legible. Handle materials with care to prevent damage.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.
   1. Store materials inside and under cover, stack flat and off floor.
   2. Project conditions (temperature, humidity, and ventilation) shall be within manufacturer's written limits.
   3. Do not install products that are under conditions outside these limits.

1.08 WARRANTY

1. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
2. Provide manufacturer's warranty agreeing to repair or replace windows and window components that fail within three years after Date of Substantial Completion due to, but not limited to, the following:
   a. Structural failure, failure of welds, and deterioration of metals and finishes beyond that expected under detention use and normal weathering.

PART 2 PRODUCTS

2.01 DESIGN PERFORMANCE

A. Fixed bullet-resistant windows shall be of the “non-ricochet” type rated to Level 3 ballistics to resist a .44 magnum projectile per UL 752. This design is intended to permit the capture and retention of an attacking projectile.

B. Fixed bullet-resistant windows shall not be removable from threat side.

2.02 MANUFACTURERS

A. Fixed Bullet-Resistant Windows as Inner Lites at Exterior Windows: Subject to compliance with these specifications, provide products of one of the following:
   1. Armortex; www.armortex.com. (Basis of Design)
   2. Bullet Guard Inc.; www.bulletguard.com.
   3. Protective Structures, Ltd.; www.protectivestructures.com.
   4. Total Security Solutions, Inc; www.tssbulletproof.com.
   5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Security Fasteners: Subject to compliance with these specifications, provide products of one of the following:

1. Acument Global Technologies: www.acument.com.
2. Safety Socket Screw Corporation: www.safetysocket.com.
3. Tamperproof Screw Co, Inc: www.tamperproof.com.
4. Tamper-Pruf Screws, Inc: www.tamper-pruf-screws.com.
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.03 ASSEMBLIES

A. Security and Detention Windows:
   1. Dimensions, profiles, features, and performance specified and indicated on drawings are required; do not deviate unless specifically approved by Architect under substitution procedures specified in Section 01 25 00 - Substitution Procedures.
   2. Design to fit openings indicated on drawings; design to accommodate deviation of actual construction from dimensions indicated on drawings.
   3. Fabricate frames and sash with corners mitered or coped full depth with concealed welded joints.
   4. Design anchorages to provide performance equivalent to that required for window unit; provide anchorages at least equivalent to those by which the tested units were anchored to the test frame.
   5. Label units to indicate which side is which, such as inside/outside or secure/non-secure; use labels that are removable after installation but durable enough not to be lost during delivery, storage, handling, and installation.

2.04 ASSEMBLY COMPONENTS

A. Aluminum Framing: ASTM B221 (ASTM B221M) extrusions of alloy and temper selected by manufacturer for strength, corrosion resistance, and finish required; not less that 1/8 inch thick at any location of frame and sash members.

B. Glazing Components:
   1. Glazing blocks: neoprene rubber spacer blocks within frame spaced to provide ventilation gaps in between glass and frame, similar to "speak around" type glazing installation. The intent is for this gap to provide ventilation of area between bulletproof panel and aluminum clad window system.
   2. Glazing tape: manufacturer's standard.

C. Security Fasteners: Operable only by tools produced by fastener manufacturer or manufacturer's licensee; head style appropriate to installation conditions, strength, and finish of materials being fastened; use countersunk heads wherever possible.

2.05 FINISHES

A. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that window openings are ready for installation of windows.

B. Verify that all supports have been installed per requirements of the Contract Documents and Architectural Drawings, and approved shop drawings, if required.

C. Notify Architect if conditions are not suitable for installation of windows; do not proceed until conditions are satisfactory.

3.02 PREPARATION

A. Clean and prepare all surfaces per manufacturers recommendations for achieving the best results for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and drawing details, and UL 752.
B. Install windows in correct orientation (inside/outside or secure/non-secure).
C. Install at mounting height compliant with federal and state accessibility standards.
D. Verify proper overlap of bullet resistant frame with bullet resistant wall panels, to provide listed ballistic resistance.
E. Clean and prepare all surfaces per manufacturers recommendations for achieving the best results for the substrate under the project conditions.
F. Anchor windows securely in manner so as to achieve performance specified.
G. Separate metal members from concrete and masonry using bituminous paint.
H. Set sill members and sill flashing in continuous bead of sealant.

3.04 CLEANING

A. Comply with Section 01 74 19 - Construction Waste Management and Disposal.
B. Clean exposed surfaces of product and accessories promptly after installation, removing exces sealant, labels, and protective covers, without damaging finishes.
C. Remove and replace defective work.

3.05 PROTECTION

A. Protect installed work from damage during subsequent construction operations until date of Substantial Completion or Owner's beneficial use of facility, whichever occurs first.
B. Touch-up and repair scratches or damage caused in shipping or handling of the products. Repair damaged units prior to completion and acceptance of the project or replace with new, per direction of Architect.

END OF SECTION

SECTION 08 56 59
SERVICE AND TELLER WINDOW UNITS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section is included in the Metal Windows Trade Bid. See Section 08 00 01 - Metal Windows Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricate, furnish, deliver, and install the following work:
   1. Preassembled bullet-resistant and non bullet-resistant service and teller window units, including integral glazing, bullet-resistant counter with dip tray, and slotted voice tube frame.
   2. Accessories required for a complete installation, including but not limited to anchors and fasteners.

1.03 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association; www.aamanet.org.
B. ASTM International (ASTM); www.astm.org.
C. CDPH. California Department of Public Health; www.cdph.ca.gov.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AAMA 611 - Specification for Anodized Architectural Aluminum.
C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
E. UL 752 - Standard for Bullet-Resisting Equipment.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate work with adjacent materials specified in other sections and as indicated on drawings and approved shop drawings.
B. Coordinate electrical service and rough-in requirements.
C. Preinstallation Meeting: Prior to start of installation arrange a meeting on site to familiarize installer and installers of related work with requirements relating to this work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals:
   1. Product Data: Submit manufacturer's product data for specified products indicating materials, operation, glazing, finishes, and installation instructions.
   2. Shop Drawings: Indicate configuration, sizes, rough-in, mounting, anchors and fasteners, and installation clearances.
   3. Test Data: Test reports for specific window model and glazing to be furnished, showing compliance with all specified requirements; window and glazing may be tested separately, provided window test sample adequately simulates the glazing to be used.
   4. Samples for Selection of Finishes:
      a. Applied Finishes: Color charts for factory finishes.
      b. Color Anodized Finishes: Submit two samples, 4 inch by 4 inch in size illustrating metal finishes for each finish specified.
   5. Installer Qualification Statement.

6. Testing Agency Qualification Statement.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Metal Windows Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Pre-consumer and Post-consumer recycled content.
         2) Environmental Product Declarations (EPD).
         3) Material Ingredients and Health Product Declarations (HPD).

D. Closeout Submittals:
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.
   3. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

B. Testing Agency Qualifications: Independent testing agency with documented experience in conducting tests of the type specified.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver units in manufacturer's original packaging and unopened containers with identification labels intact.

B. Store units in area protected from exposure to weather and vandalism.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Provide manufacturer's warranty agreeing to repair or replace units and their components that fail in materials or workmanship within five years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 SERVICE AND TELLER WINDOW UNITS

A. Location: Built within interior wall, as indicated on drawings.

B. Glazing: Single (monolithic), clear polycarbonate, tested to satisfy the specified ballistic performance criteria.

2.02 ASSEMBLY COMPONENTS

A. Windows: Factory-fabricated, finished, and glazed, with extruded aluminum slotted voice tube frame, complying with UL 752 Level 3, and glazing stops; complete with hardware and anchors.
   1. Provide window units that are re-glazable from the secure side without dismantling the non-secure side of framing.
   2. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof. Fully weld corners.
   3. Apply factory finish to exposed surfaces.

B. Deal Tray: Integral with window sill.
   1. Material: One piece stainless steel tray construction, 18 gauge, 0.0500 inch minimum thickness.
   2. Overall Size with Curved Tray Bottom: 8 inch deep by 11-1/2 inch wide.

2.03 MATERIALS

A. Aluminum Extrusions: Minimum 1/8 inch thick frame and sash material complying with ASTM B221 and ASTM B221M.

2.04 FINISHES

A. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils thick.
B. Color: To be selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that window openings are ready for installation of windows.
B. Verify that correct embedded anchors are in place and in proper location; repair or replace anchors if necessary, to achieve satisfactory installation.
C. Notify Architect if conditions are not suitable for installation of units; do not proceed until conditions are satisfactory.

3.02 PREPARATION

A. Prior to installing the bullet resistive material, the Metal Windows Trade Contractor Contractor shall verify that all supports have been installed per the requirements of the Contract Documents and Architectural Drawings, and approved shop drawings, if required.
B. Installer shall notify Architect of any unsatisfactory preparation that is responsibility of another installer.
C. Clean and prepare all surfaces per manufacturers recommendations for achieving the best results for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install units in correct orientation (inside/outside or secure/non-secure).
C. Anchor units securely in manner so as to achieve performance specified.

3.04 ADJUSTING

A. Adjust operating components for smooth operation while also maintaining a secure, weather-tight enclosure and a tight fit at the contact points; lubricate operating hardware.

3.05 CLEANING

A. Remove protective material from factory finished surfaces.
B. Clean exposed surfaces promptly after installation without damaging finishes.
C. Comply with Section 01 74 19 - Construction Waste Management and Disposal.

3.06 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain operable units.
   1. Instructor: Manufacturer's training personnel.
   2. Location: At project site.
   3. Use operation and maintenance manual as training reference, supplemented with additional training materials where required.

3.07 PROTECTION

A. Provide temporary protection to ensure that service and teller windows are without damage upon Date of Substantial Completion or Owner's beneficial use of facility, whichever occurs first.

B. Touch-up and repair scratches or damage caused in shipping or handling of the products. Repair damaged units prior to completion and acceptance of the project or replace with new, per direction of Architect.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following glazing work:
   1. Single panes (S), and insulated glazing units (IGU), including:
      a. Fire resistance rated glazing.
      b. Fire protective rated glazing.
      c. Impact-resistant glazing.
      d. Ballistics-resistant glazing.
      e. Laminated security glazing.
      f. Translucent glazing.
      g. Glazing in interior hollow metal borrowed lites and sidelights, including fire-resistance rated and non-rated glazing.
      h. Glazing vision panels in doors, including fire-resistance rated and non-rated glazing.
   2. Surface-applied patterned window films.
   3. Digitally printed colored ceramic frit window patterns.
   4. Transparent one-way mirror glazing.
   5. Glazing compounds and accessories required for a complete installation..

B. The term "glazing" shall include both the noun and verb definitions of the word.

1.02 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.
B. ASTM. ASTM International; www.astm.org.
C. CDPH. California Department of Public Health; www.cdph.ca.gov.
D. CFR. Code of Federal Regulations; www.gpo.gov.
E. GANA. Glass Association of North America; www.glasswebsite.com:
F. IGMA. The Insulating Glass Manufacturers Alliance; www.igmaonline.org.
G. NFPA. National Fire Protection Association: www.nfpa.org:
H. NFRC. National Fenestration Rating Council; nfrc.org:
I. NIJ. National Institute of Justice; nij.gov.
J. UL. Underwriters Laboratories Inc.; www.ul.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
F. ASTM C1036 - Standard Specification for Flat Glass.
G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.
I. ASTM C1193 - Standard Guide for Use of Joint Sealants.

J. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.
K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
L. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
M. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
N. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
O. GANA (GM) - GANA Glazing Manual.
P. GANA (SM) - GANA Sealant Manual.
Q. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use.
R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
T. NFRC 100 - Procedure for Determining Fenestration Product U-factors.
U. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
V. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.
W. NIJ 0108.01 - Standard for Ballistic Resistant Protective Materials.
X. UL 752 - Standard for Bullet-Resisting Equipment.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data on each Glazing Type Required: Provide structural, physical and environmental characteristics, size limitations, manufacturer's special handling and installation requirements.
    2. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, applicable glazing type manufacturer's product recommendations, and identify available colors.
    3. Samples: Submit two samples 12 by 12 inch in size of glass and plastic units, showing coloration and design.
    4. Shop Drawings for Ballistics-Resistant Glazing: Include cuts and anchor spacing, reinforcement and location. Include cut openings and all accessories, including speaker ports, speak around spaced edge gasket materials, polished edges, or other items called out in the Drawings or Specifications.
    5. Test Reports for Ballistics-Resistant Glazing: current UL Listing Verification and UL 752 Test Results as provided by Underwriters Laboratories demonstrating compliance with specified ballistic resistance.
    6. Where products are proposed are not those listed in tested hollow metal or glazed aluminum curtainwall assemblies, submit engineer’s or manufacturer’s certification stating that the products are equivalent to those listed in tested assemblies, and are eligible for substitution under applicable testing limitations.
    7. Specimen warranties.
C. Sustainability Submittals
    1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional

prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Glass and Glazing Trade Contractor shall provide all documentation indicating applicability of products of this section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Regulatory Agency Approvals:
1. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
    a. Listings and Labels: Fire-rated framing and glazing shall be under current follow-up services by UL or Intertek/Warnack Hersey, and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.
2. Safety Glazing Products: Comply with requirements of 16 CFR 1201 and ANSI Z97.1.
3. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
    a. GANA Publications: GANA (LGRM)and GANA (GM).
    b. IGMA Publication for Insulating Glass: IGMA TM-3000.
4. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with certification label of the following testing and inspecting agency:
    a. Insulating Glass Certification Council
    b. Associated Laboratories, Inc.

B. Single Source Responsibility:
1. Glass: Obtain the following through one source from a single manufacturer for each glass type: Clear float glass, coated float glass, laminated glass, and insulating glass units (IGU).
2. Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-E-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.
3. Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

C. Coordination for Exterior Openings required to meet Windorne Debris Impact Testing:
1. Coordinate with Section 08 11 13 - Hollow Metal Doors and Frames and Section 08 44 13 - Glazed Aluminum Curtain Walls to assure that all glazing proposed for use is equal or better

in impact protection performance to that required by submitted design engineering and stated requirements of tested assemblies.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, and Section 01 60 00 - Product Requirements.

B. Deliver the materials to the project with the manufacturer's UL Listed Labels intact and legible.

1.07 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Sealed Insulating Glass Units: Provide a written ten year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units, issued by the manufacturer upon completion of the work and beginning on the date of Substantial Completion. Defects are as follows:

1. Loss of light transmittance greater than three percent, determined according to manufacturer's technical data.
2. Seal leakage.
3. Crushing or corrosion of spacer.
4. Buildup of visible internal moisture.

C. Fire Rated Glazing: Provide written three year warranty for material obstruction of vision between the interior glass surfaces, downgrading of the fire rating, and other defects including replacement of defective units, issued by the manufacturer upon completion of the work and beginning on the date of Substantial Completion

D. Laminated Glass: Provide a five year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

E. Ballistics-Resistant Laminated Acrylic / Polycarbonate Sheet Glazing: Provide a five year manufacturer warranty to include coverage for breakage, coating failure, abrasion resistance, including providing products to replace failed units.

F. Digitally Printed Colored Ceramic Frit Glass: Provide a written minimum five year warranty from date of manufacturer. Warranty shall cover deterioration under normal conditions of use.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Float Glass Manufacturers: Subject to compliance with these specifications, provide products of one of the following:

1. Cardinal Glass Industries: www.cardinalcorp.com.
2. Guardian Glass, LLC: www.guardianglass.com.
3. Pilkington North America Inc: www.pilkington.com/na.
4. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com.
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Fire Protective Rated Glass Manufacturers/ Products. Subject to compliance with these specifications, provide products of one of the following:

1. Manufacturers: Subject to compliance with requirements, provide one of the following:
   a. Pilkington North America Inc.; Pyrostop: www.pilkington.com.

b. SAFTIFIRST, a division of O'Keefe's Inc; SuperClear HS or HS-LI: www.safti.com
c. Technical Glass Products; FireLite NT: www.fireglass.com. (Basis of Design)
d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Laminated Security Glass Manufacturers/Products. Subject to compliance with these specifications, provide products of one of the following:
1. School Guard Glass; IG-4A: https://schoolguardglass.com, or equal.
a. Where School Guard glazing is used, sealant and accessories shall be of types approved by School Guard manufacturer.
2. Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.

2.02 DESCRIPTION

A. Regulatory Requirements:
1. Glass-Ceramic Safety Glazing: UL- or WH-listed as fire-protection-rated glazing and complying with 16 CFR 1201 test requirements for Category II without the use of a surface-applied film.
2. 20-Minute Fire Doors: Hose stream test is not required.

2.03 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
3. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
1. In conjunction with weather barrier related materials described in other sections, as follows:
2. To maintain a continuous vapor retarder and/or air barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 7 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 7 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.04 PERFORMANCE REQUIREMENTS - INTERIOR GLAZING ASSEMBLIES

A. STC Rating Performance:
1. STC 30: Doors between classrooms and corridors: Minimum 1/4 inch thick tempered or float glass.
a. Provide full perimeter gaskets, including head, jamb and bottom drop seals. See Section 08 71 00 - Door Hardware.

2. STC 35: Between Media Center and outside; one inch insulated glass unit (IGU).
3. STC 45: Between Media Center and corridor; 1/4 inch laminated glass, two inch airspace, and minimum 3/16 inch glass.

B. S2 - Fire Rated Glazing: Provide 45 minute, 60 minute or 90 minute as indicated in the drawings.
1. Glazing assembly to meet Cat II impact requirements of ANSI Z97.1 or 16 CFR 1201.
2. Permanently identify individual lites with a listing mark.
3. Visible daylight transmission: 80 percent minimum.
a. Glazing material shall be optically clear, colorless and free from unusual distortion.

2.05 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
5. Thicknesses: As indicated; provide greater thickness when required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.

2.06 INSULATING GLASS UNITS

A. Manufacturers:Subject to compliance with these specifications, provide products of one of the following: except where specifically noted otherwise:
1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
2. Guardian Glass, LLC: www.guardianglass.com/#sle.
3. Pilkington North America Inc: www.pilkington.com/na/#sle.
4. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com.
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. All Exterior Insulated Glazing Types shall use low-iron; Vitro Starphire (or equal) on in board and outboard lites.
4. Metal-Edge Spacers: Aluminum, bent and soldered corners.
5. Spacer Color: Black.
6. Edge Seal:
a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
b. Color: Black.
7. Purge interpane space with dry air, hermetically sealed.

C. NOTE: INSULATED GLASS UNIT TYPES MAY BE LISTED OUT OF NUMERICAL ORDER BY TYPE NUMBER.
D. Type IG-1A - Sealed Insulating Glass Units: Vision glass, triple glazed.
    1. Applications: Exterior glazing unless otherwise indicated.
    2. Space between lites filled with 90 percent argon, 10 percent air.
    3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
        a. Tint: Clear.
        b. Coating: Low-E type, on #2 surface; Vitro Solarban 60, or equal.
    4. Middle Lite: Annealed float glass 3/16 inch thick.
        a. Tint: Clear.
        b. Coating: None.
    5. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
        a. Tint: Clear.
        b. Coating: Low-E type, on #5 surface: Vitro Solarban 60, or equal.
    6. Total Thickness: 1-5/8 inch minimum.
    7. Visible Light Transmittance (VLT): 56 percent, minimum.
    8. Solar Heat Gain Coefficient (SHGC): 0.33, minimum.
E. Type IG-1 - Sealed Insulating Glass Units: Vision glass, double glazed.
    1. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
    2. Visible Light Transmittance (VLT): 74 percent, nominal.
    3. Solar Heat Gain Coefficient (SHGC): 0.41, nominal.
    4. VLT / SHGC ratio: 1.80.
F. Type IG-3: Sealed Insulating Glass Units: Athletic safety vision glazing.
    1. Applications: Provide this type of glazing where indicated on Drawings, at athletic areas.
    2. Type: Same as IG-1 except use 1/2-inch fully tempered glass for interior pane.
G. Type IG-5 - Sealed Insulating Glass Units: Light diffusing insulated glazing; between-lite space filled with argon.
    1. Basis of Design Manufacturer: Advanced Glazings Limited; www.advancedglazings.com.
    2. Application(s): High facade glazing as indicated.
    3. Outboard Lite: Annealed float glass, 1/4 inch (6mm) thick, minimum.
        a. Coating: Low-E type coating on #2 surface, Solera AGL545 veil, or equal
        b. Tint: Solexia.
    4. Inboard Lite: Annealed float glass, 1/4 inch (6 mm) thick, minimum
        a. Coating: Solera AGL401 veil, or equal.
        b. Tint: Solexia.
    5. Total Thickness: 1 inch (25 mm)
    6. Visible Light Transmittance (VLT): 32 percent.
    7. SHGC: 0.23
    8. U-Value: 0.45
    9. Total Thickness: 1 inch (25 mm)
    10. Visible Light Transmittance (VLT): 37 percent.
    11. SHGC: 0.34
    12. U-Value: 0.47
H. Type IG-10 - Sealed Insulating Glass Units: Spandrel glazing to match IG-1A.
    1. Applications: Exterior spandrel glazing unless otherwise indicated.

2. Space between lites filled with 90 percent argon, 10 percent air.
3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
    a. Tint: Clear.
    b. Coating: Same as on vision units, on #2 surface.
4. Middle Lite:
    a. Tint: Clear.
    b. Thickness: 3/16 inch.
    c. Coating: Low-E type, on #4 surface, Vitro Solarban 60, or equal.
5. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
    a. Tint: Clear.
    b. Opacifier: Ceramic frit, on #5 surface.
    c. Opacifier Color: As selected by Architect.
6. Total Thickness: 1 inch.
7. Thermal Transmittance (U-Value), Summer - Center of Glass: _____, nominal.

I. Type IG-10A - Sealed Insulating Glass Units: Spandrel glazing to match IG-1.
1. Applications: Exterior spandrel glazing unless otherwise indicated.
2. Space between lites filled with 90 percent argon, 10 percent air.
3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
    a. Tint: Clear.
    b. Coating: Same as on vision units, on #2 surface.
4. Middle Lite:
    a. Tint: Clear.
    b. Thickness: 3/16 inch.
    c. Coating: Low-E type, on #4 surface, Vitro Solarban 60, or equal.
5. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
    a. Tint: Clear.
    b. Opacifier: Ceramic frit, on #5 surface.
    c. Opacifier Color: As selected by Architect.
6. Total Thickness: 1-5/8 inch.
7. Thermal Transmittance (U-Value), Center of Glass: _____, nominal.

J. Type IG-2 - Insulating Glass Units: Safety glazing.
1. Applications:
    a. Glazed lites in exterior doors, where indicated on the drawings.
    b. Other locations required by applicable federal, state, and local codes and regulations.
    c. Other locations indicated on drawings.
2. Outboard Lite: fully tempered float glass; 1/4 inch thick.
3. Coating: Low-E type coating on #2 surface, Vitro Solarban 60, or equal.
4. Space between lites: 90 percent argon, 10 percent air.
5. Inboard Lite: fully tempered float glass; 1/4 inch thick.
6. Coating: Low-E type coating on #3 surface, Vitro Solarban 60, or equal.
7. Tint: Clear.
8. Total Thickness: 1 inch.
9. Thermal Transmittance (U-Value), Center of Glass: 0.24, nominal.

K. Type IG-2A : Triple Glazed Safety glazing.
1. Applications: Exterior glazing at locations indicated.

a. Glazed Sidelights, transoms, and panels adjacent to doors.
b. Other locations required by applicable federal, state or local codes and regulations.
c. Other locations indicated in drawings.

2. Same Type as IG-1A except use fully tempered float glass.

L. Type IG-4 - Security Glazing, double-glazed.
1. Application(s): Exterior glazing at locations indicated on drawings.
2. Outboard Lite: fully tempered float glass, 1/4 inch thick.
a. Tint: Clear.
b. Coating: Low-E type on #2 surface; Vitro Solarban 60 or equal.
3. Inboard lite: Laminated float glass, 3/8 inch thick.
a. Basis of Design: Schoolguard SG4, or equal.
1) Where School Guard glazing is used, sealant and accessories shall be of types approved by School Guard manufacturer.
2) Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.
b. Coating: none.
4. Total Thickness: 1 inch.
5. Solar Heat Gain Coefficient: 0.39.
6. Visible Light Transmittance: 69 percent.

M. Type IG-4A - Security Glazing, triple-glazed.
1. Application(s): Exterior glazing at locations indicated on drawings.
2. Outboard Lite: Tempered float glass, 1/4 inch thick, minimum.
a. Tint: Clear.
b. Coating: Low-E type on #2 surface; Vitro Solarban 60 or equal.
3. Middle Lite: Tempered float glass, 3/16 inch thick.
a. Tint: Clear.
b. Coating: Low-E type, on #4 surface; Vitro Solarban 60, or Equal.
4. Inboard Lite: Laminated float glass, 3/8 inch thick.
a. Basis of Design: Schoolguard SG4, or equal.
1) Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.
b. Coating: None.
5. Space between lites filled with 90 percent argon, 10 percent air.
6. Total Thickness: 1-5/8 inch.
7. Solar Heat Gain Coefficient: 0.32.
8. Visible Light Transmittance: 55 percent.
9. VLT/SHGC ratio: 1.72.
10. U-Value: 0.14.

N. Type IG-9 - Storm/ Hurricane Glazing
1. Applications: As indicated in Drawings.
2. Outboard Lite: 1/4 inch Heat Strengthened low-E film on #2 Surface Exterior Lite
a. Tint: Same as IG-1

3. Space: 1/2 inch filled with same as IG-1
4. Inboard Light: 9/16 inch heat strengthened laminated glass interior lite (1/4 inch HS-0.090 inch PVB-1/4 inch HS)
5. Edge Spacer: Same as IG-1
6. Overall IG Thickness: 1-5/16 inch.

2.07 GLAZING UNITS

A. NOTE: GLAZING UNIT TYPES MAY BE LISTED OUT OF NUMERICAL ORDER BY TYPE NUMBER.

B. Type S-1 - Monolithic Interior Vision Glazing:
   1. Applications: Interior glazing unless otherwise indicated.
   2. Glass Type: Annealed float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.

C. Type FPR S-1 - Fire-Protection-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and does not block radiant heat, to achieve indicated fire-rating period of 45 minutes or less.
   1. Applications:
      a. Glazing in fire-rated door assembly.
      b. Glazing in fire-rated window assembly.
      c. Sidelights, borrowed lites, and other glazed openings in partitions indicated as having an hourly fire rating.
      d. Other locations as indicated on the Drawings.
   2. Glass Type: Glass-ceramic safety glazing

D. Type S-2 - Monolithic Safety Glazing: Non-fire-rated.
   1. Applications:
      a. Glazed lites in doors, except fire doors.
      b. Glazed sidelights to doors, except in fire-rated walls and partitions.
      c. Other locations required by applicable federal, state, and local codes and regulations.
      d. Other locations indicated on drawings.
   2. Glass Type: Fully tempered safety glass as specified.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal, or as indicated in the Drawings for specific locations.

E. Type S-3 - Security Glazing: Laminated glass.
   1. Applications: Locations as indicated on drawings.
   2. Tint: Clear.
   3. Thickness: 7/16 inch.
   4. Basis of Design: Schoolguard SG4, or equal.
      a. Where School Guard glazing is used, sealant and accessories shall be of types approved by School Guard manufacturer.
      b. Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.

F. Type S-10 - Glass Shelves:
   1. Applications: Locations as indicated on drawings.
   2. Tint: Clear.
   3. Glass Type: Fully tempered float glass with ground edges and corners; ASTM C1048.

4. Thickness: 1/4 inch, nominal.

G. Type S-9 - Laminated Glass
   1. Located as indicated on the Drawings.
   2. Type: Laminated Safety Glass.
   3. Thickness: 1/4 inch.

2.08 SURFACE-APPLIED PATTERNED WINDOW FILMS

A. Pressure applied polyester (PET) window film. Products containing PVC will not be acceptable.
   1. Fire performance and smoke development classification: Class C or better when tested in accordance with ASTM E84.
   2. Top Coat: High performance scratch resistant UV ink-jet receptive topcoat.
   3. Thickness: 2.0 mil minimum.
   4. Color: To be selected by Architect from manufacturer's full range.
   5. Pattern: To be selected by Architect from manufacturer's full range of standard and custom patterns.
   6. Adhesive: Permanent pressure sensitive.
   7. Liner: 2.0 mil minimum, PET.
   8. Widths: sufficient to apply to entire glass pane without seams, up to 70 inches wide.
   9. Products / manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   10. 3M Decorative Window Films; _____ : www.3m.com. (Basis of Design)
   11. Clear View Window Film Solutions; _____: www.clearhue.com.
   12. Llumar; Commercial Decorative Window Film _____: llumar.com.
       a. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.09 DIGITALLY PRINTED COLORED CERAMIC FRIT:

A. Location and Pattern as indicated in drawings.
B. Varying opacities, as selected by Architect . Project will include multiple opacities.
C. Colors: Varying colors as selected by Architect from manufacturer's full range of standard and custom colors. Project will include multiple colors of digitally printed colored ceramic frit.
D. Provide graphic design services to convert Architect-provided images to sufficient graphic quality for application of ceramic frit.
E. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. OldCastle Building Envelope: iGlass; www.obe.com. (Basis of Design)
   2. Prelco: Prel-Design; www.prelco.ca.
   3. Press Glass: Digital Print; www.pressglass.us.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.10 BALLISTICS-RESISTANT GLAZING

A. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. Global Security Glass; www.security-glazing.com.
   2. Patriot Armor; https://pasarmor.com/.
   3. Total Security Solutions, Inc, www.tssbulletproof.com. (Basis of Design)

4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Type S-14 - Ballistics-Resistant Glazing: Laminated Acrylic / Polycarbonate Sheets:
   1. Applications: Locations as indicated on the Drawings.
   2. Tint: Clear.
   3. Thickness: Suitable to meet performance criteria.
   4. Performance Criteria:
      a. Bullet Resistance: Pass UL 752, ASTM C1172, and NIJ 0108.01.
         1) UL Standard Level 3 bullet resistant glazing material rating.
      b. Visible Light Transmittance (VLT): ____ percent, nominal.

2.11 GLAZING COMPOUNDS

A. Except where otherwise noted by applicable glazing type manufacturer, use the following:
   1. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
   2. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected by Architect.

2.12 ACCESSORIES

A. General:
   1. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.
   2. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
   3. Setting Blocks, Spacers: Compatible with TGU sealant.

B. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II . Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

C. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II . Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

D. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

E. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot ; ASTM C864 Option II; color black.

F. Glazing Clips: Manufacturer's standard type.

2.13 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerf cuts at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas with Glazing Installer present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, substrates, structural support, tolerances, sizes, squareness, offsets at corners, levelness, plumbness, humidity, moisture content level, functioning weep system, minimum face and edge clearances, sealed joints, cleanliness and other conditions are ready to receive work.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings, which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.
   1. Clean glazing channels and other framing members to receive glass, with appropriate solvent, immediately before glazing, and wipe dry. Remove coatings, which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use, within maximum of 24 hours before glazing.

B. Prior to installing ballistics-resistant glazing, the Glass and Glazing Trade Contractor shall verify that all supports have been installed per the Drawings, and approved Shop Drawings. Installer shall notify Architect of any unsatisfactory preparation that is responsibility of another installer.

C. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

D. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, and paint.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
F. Carefully trim protruding tape with knife.

3.06 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.
B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
E. Place glazing tape on free perimeter of glazing in same manner described above.
F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
G. Carefully trim protruding tape with knife.

3.07 INSTALLATION - WET GLAZING METHOD (COMPOUND AND COMPOUND)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.
B. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24 inch centers, kept 1/4 inch below sight line.
C. Locate and secure glazing pane using glazers' clips.
D. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3.08 INSTALLATION - WET/DRY GLAZING METHOD (PREFORMED TAPE AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
C. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
D. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
    1. Place glazing tape on glazing pane of unit with tape flush with sight line.
E. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.09 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers, using care not to damage finishes of adjacent stops and other materials.
C. Remove nonpermanent labels immediately after glazing installation is complete.
D. Clean glass and adjacent surfaces after sealants are fully cured.
E. Clean glass on both exposed surfaces after installation in accordance with glass manufacturer's written recommendations.

3.10 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

B. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

C. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 08 83 00
MIRRORS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section is included in the Glass and Glazing Trade Bid. See Section 08 00 02 - Glass and Glazing Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work as specified herein as indicated in the drawings:
   1. Glass mirrors, custom fabricated for application to walls or other substrates, with or without perimeter frames.

B. Accessories required for a complete installation including but not limited to:
   1. Shatterproof safety film backing.
   2. Mirror mounting channels and setting blocks.
   3. Mirror mastic or double-sided tape, for frameless installation.

1.03 DEFINITIONS

A. Deterioration of Mirrors: Defects developed from normal use that are attributable to the manufacturing and fabrication process, that are not attributed to glass breakage or to maintaining and cleaning mirrors by methods contrary to mirror manufacturer's written instructions.
   1. Defects include undercutting, discoloration, spotting, and clouding of the silver film as defined by ASTM C1503.

1.04 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.

B. CFR. Code of Federal Regulations: www.govinfo.gov.

C. GANA. Glass Association of North America: www.glasswebsite.com.

D. SCAQMD. South Coast Air Quality Management District: www.aqmd.gov.

1.05 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

C. ASTM C1036 - Standard Specification for Flat Glass.

D. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror.

E. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test.

F. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

G. GANA (GIB 01-0300) - Glass Informational Bulletin (Proper Procedures for Cleaning Architectural Glass Products).

H. GANA (GM) - GANA Glazing Manual.

I. GANA (MD-06-0413) - Mirrors: Handle with Extreme Care (Tips for the Professional on the Care and Handling of Mirrors).

J. SCAQMD 1168 - Adhesive and Sealant Applications.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals

1. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
    a. Include data on finishes, protective coatings, use limitations, cleaning instructions and recommendations.
2. Shop Drawings: Submit drawings indicating the following for each location at which mirrors are to be installed: field measurements, mirror dimensions, edge details, hardware, and anchoring details.
3. Samples: Submit two samples, 12 by 12 inches in size, illustrating mirrors design, edging, and coloration.
4. Manufacturer's Certificate: Certify that mirrors meet or exceed specified requirements.
5. Specimen warranty.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Glass and Glazing Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with the following:
    a. Section 01 70 00 - Execution and Closeout Requirements.
    b. Section 01 78 00 - Closeout Submittals.
2. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (MD-06-0413) and 16 CFR 1201 for Category II materials as applicable, for glazing installation methods.
1. Maintain one copy of each reference standard on project site.

B. Single Source Responsibility: Furnish mirror and each type of accessory from one manufacturer for entire Project, unless otherwise acceptable to Architect.

1.08 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements.

B. Comply with manufacturer’s instructions and recommendations, GANA recommendations, and as follows:
1. Protect each mirror from damage during shipping, handling and installation until Final Completion.
2. Do not slide one lite of mirror against another.
3. Do not use sharp objects near unprotected mirrors.

1.09 FIELD CONDITIONS

A. Do not install mirrors when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.10 WARRANTY

A. Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.

B. Special Warranty: Provide written five year material warranty, executed in Owner's name and signed by mirror manufacturer, agreeing to replace mirrors that deteriorate as defined in DEFINITIONS paragraph above, and agreeing that mirrors shall not contain silvering defects resulting in discoloration, black spots, or clouding of the silver film that materially obstructs the mirror image of the vision area. Warranty shall be issued by the manufacturer upon completion of the work and beginning on the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mirror Design Criteria: Select materials and/or provide supports suitable to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.

B. Mirror Glass: ASTM C1036, Type 1 - Transparent Flat, Class 1 - Clear, Quality - Q1 (high-quality mirrors); silvering, protective coating, and quality requirements in compliance with ASTM C1503.

1. Annealed, high quality clear glass, silver coated on the backside.
2. Custom sizes, as indicated on drawings.

2.02 FABRICATION

A. Fabricate mirrors in accordance with Shop Drawings, requirements of these specifications, and in accordance with the GANA (GM).

1. Edge Treatment: Square polished and sealed edge, unless noted otherwise.

2.03 ACCESSORIES

A. Glazing Clips: Continuous J-channels.

1. Basis of design; CR Laurence D-636A / D-645A or approved equal.

B. Mirror Attachment Accessories: Satin anodized aluminum.

C. Backing: Shatter-proof safety tape backing.

1. Safety Tape: Provide shatterproof safety tape for mirrors that meets 16 CFR 1201 for impact resistance and is compatible with mastic adhesive.
    a. Basis of design: CR Laurence Safety Backing Tape or approved equal.

D. Setting Blocks: Provide resilient clear plastic setting blocks specifically made for mirror installation in channels and acceptable to mirror manufacturer / fabricator.

E. Mastic / Adhesive Tape: For frameless mirror installation where documented as such in drawings, or where recommended by manufacturer / fabricator due to unit sizes: Low VOC 100 percent solids mastic adhesive or double sided adhesive tape meeting SCAQMD 1168 VOC limits, manufactured specifically for mirror installation, certified by fabricator to be compatible with safety backing tape and mirror silvering.

PART 3 EXECUTION

3.01 EXAMINATION

A. See Section 01 40 00 - Quality Requirements.

B. Carefully examine installation areas with Installer present, for compliance with requirements affecting work performance.

1. Verify that field measurements, surfaces, substrates, structural support, tolerances, levelness, plumbness, humidity, cleanliness and other conditions are ready to receive work.
2. Field verify location of all devices and / or equipment to be mounted to the wall prior to fabrication.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work of this section constitutes acceptance of substrates.

3.02 PREPARATION

A. Surface Preparation: Refer to manufacturer's instructions and recommendations for preparation of substrates, and as follows:
   1. Clean contact surfaces with solvent and wipe dry.

3.03 INSTALLATION

A. Install mirrors in accordance with drawings, submittals, GANA (MD-06-0413), manufacturer's recommendations, and as follows:
   1. Set mirrors plumb and level, and free of optical distortion.
   2. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.
   3. Shatter-Proof Safety Tape: Provide safety film tape on 100 percent of rear surface of mirror.
   4. Mechanical fastening: Unless specifically detailed otherwise in documents, provide continuous anodized J-channel at perimeter edges of mirror. Set mirrors on glazing tape or blocks within bottom channel.
   5. Use mastic installation only where frameless mirror installation is required in details, or when manufacturer / fabricator requires due to individual mirror panel sizes

3.04 FIELD QUALITY CONTROL

A. Field Tests and Inspections:
   1. Comply with requirements of Section 01 40 00 - Quality Requirements.
   2. Test: Adhesion of silver using the standard tape pull method per ASTM D3359.
   3. Inspection: Verify mirrors are free of chips, cracks, and other inclusions that could inhibit structural or aesthetic integrity.

B. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Replace damaged, and defective materials or items with new if repair not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Remove wet glazing materials from finish surfaces.

C. Remove labels after work is complete.

D. Clean mirrors and adjacent surfaces per GANA (GIB 01-0300) just prior to inspection for Substantial Completion, and just prior to Final Completion or Owner occupancy, whichever occurs first.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

B. After installation mark each pane with an 'X' by using removable tape.

END OF SECTION

SECTION 08 91 00
LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing louvers, frames and accessories as specified, as scheduled, and as shown in the Contract Drawings.

1.02 ABBREVIATIONS AND ACRONYMS

A. AMCA. Air Movement and Control Association International, Inc.; www.amca.org.

B. ASTM. ASTM International; www.astm.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

C. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating.

D. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices.

E. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals

1. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
2. Color Selection Charts: Submit physically printed manufacturers color charts for selection of finished louver and pre-finished flashings from full range of available standard colors.
3. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, and tolerances; head, jamb and sill details; blade configuration, screens, blank-off areas required, and frames.
4. Verification Samples: Submit three samples 2 by 2 inches in size illustrating finish and color of exterior and interior surfaces.
5. Test Reports: Independent agency reports showing compliance with specified performance criteria.
6. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. Except where otherwise assigned below, the Construction Manager shall provide all documentation indicating applicability of products of this section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals

1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Include lubrication schedules, adjustment requirements.
3. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.

1. Finish: Include twenty year coverage against degradation of exterior finish.
2. Issued by the manufacturer upon completion of the work and beginning on the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Louvers:

1. Basis of Design Manufacturer / Product: Greenheck; www.greenheck.com / EHH501, or an Architect acceptable equivalent subject to compliance with requirements from one of the following:
   a. American Warming and Ventilating: www.awv.com.
   b. Construction Specialties, Inc: www.c-sgroup.com.
   c. Nystrom Building Products : www.nystrom.com.
   d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.

1. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf without damage or permanent deformation.
2. Louvers shall be Class A per AMCA 550 Wind Driven rain tests for minimal water intrusion.
3. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.
4. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.

B. Stationary Louvers: Horizontal blade, formed galvanized steel sheet construction, with intermediate mullions matching frame.

1. Free Area: ____, minimum.
2. Blades: Straight.
3. Frame: 4 inches deep, channel profile; corner joints mitered and , with continuous recessed caulking channel each side.
4. Steel Thickness, Galvanized: Frame 16 gauge, 0.0598 inch minimum base metal; blades 16 gauge, 0.0598 inch minimum base metal.
5. Steel Finish: Superior performing organic coating, finished after fabrication.

2.03 MATERIALS

A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

B. Polyvinylidene Fluoride Coating: Minimum 70 percent PVDF Superior performance, three coat finish, primed, with chrome conversion pre-treatment, complying with AAMA 2605 .

1. Three-Coat System: Nominal 0.8 mils each of a urethane primer, fluoropolymer color coat, and a clear topcoat to seal and protect the entire system. the total film thickness is 2.25-2.55 mils.
2. Color: To be selected by Architect from manufacturer's full range of standard and custom colors.
3. Field Touch-up Materials: As recommended by coating manufacturer for field application.

2.04 ACCESSORIES

A. Fasteners and Anchors: Galvanized steel.

B. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.

C. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

D. Sealant: See Section 07 92 00 - Joint Sealants.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:

1. Carefully examine installation areas with Installer/ Applicator present, for compliance with requirements affecting work performance.
   a. Verify that opening field measurements, surfaces, substrates, structural support, utility connections, tolerances, levelness, plumbness, cleanliness and other conditions are ready to receive work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions, Drawings, submittals and as follows:

1. Install louvers level and plumb.
2. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
3. Secure louver frames in openings with concealed fasteners.
4. Coordinate with installation of mechanical ductwork.
5. Coordinate with installation of louver actuators.

3.03 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items.

1. Finish touch-up damaged surface finishes.
2. Replace damaged materials or items with new if repair is not acceptable to Architect.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

1. Strip protective finish coverings.
2. Clean surfaces and components.

3.05 PROTECTION

A. Protect installed work from subsequent construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 09 00 02
TILE TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Tile Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1 - 8, 10, and 11, as most recently amended.

B. Trade Contract shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid bond specified therein.

C. Every Trade Contract for work of this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Tile Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the Tile subcontractor or an entity engaged by the Construction Manager, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch, who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this Trade Bid Section shall include all furnishing and installation of tile systems for the project, as shown on the drawings, as described in the specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not necessarily exclusively) shown on the drawings by the section number 09 00 02 or the abbreviation "SC-TILE".

C. The work of this Trade Contract Section shall include the scope of each of the following sections in their entirety:
   1. Section 09 30 00 - Tiling.

D. The work of this Trade Bid Section shall include part of the scope of each of the following sections:
   1. Section 03 54 00 - Concrete Toppings: self-leveling underlayment applied to concrete slabs, for areas to receive tile.
   2. Section 07 92 00 - Joint Sealants Sealant at control joints within tile work and other joints at tile where shown on drawings.

E. The Tile Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Section 03 30 00 - Cast-in-Place Concrete: Cast-in-place concrete substrate surface and saw-cut joint locations, and remediation of flatness and levelness tolerances in substrate surfaces.
   2. Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete.
   3. Section 09 21 16 - Gypsum Board Assemblies: Substrate surfaces for wall tile.
   4. Section 09 65 00 - Resilient Flooring: interface of tile and other flooring.
   5. Section 09 67 00 - Fluid-Applied Flooring: interface of tile and other flooring.
   6. Section 09 68 13 - Tile Carpeting: interface of tile and other flooring.
   7. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: accessories installed in tiled surfaces.
   8. Section 12 48 13 - Entrance Floor Mats and Frames: interface of tile and recessed entry mats and frames, including thickset mortar beds under entry mats and frames when surrounded by tile as shown on drawings.
   9. Division 22: Plumbing sections.
   10. Division 26: Electrical sections.

F. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

G. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Bidder shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.

H. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing Laws and Codes.

1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

J. Cutting and Patching:
   1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical sections. Where other sections indicate that cutting and coring of tile to accommodate the work of those sections is to be performed by tile subcontractor, the costs shall be borne by the other section.
   2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
   3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
   4. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for reference standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See each individual technical specification section listed above for required product literature, samples, shop drawings, and other submittals required.

1.06 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.07 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, the Tile Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Tile Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.08 WARRANTY

A. See each individual technical specification section listed above for warranty requirements.

B. See Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

2.01 CLEANING

A. Tile Trade Contractor shall be responsible for cleaning up Tile Trade Contractor's own work at the end of each day, and depositing waste and debris created by Tile Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

SECTION 09 00 03
ACOUSTIC CEILINGS TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Acoustical Tile Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1-8, 10, and 11, as most recently amended.

B. Acoustical Tile Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid deposit specified therein.

C. Every Trade Bid for work under this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Acoustic Ceilings Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the Acoustical Tile subcontractor or an entity engaged by the subcontractor, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this Trade Bid Section shall include all furnishing and installation of acoustical ceilings for the project, as shown on the drawings, as described in the specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 09 00 03 or the abbreviation "SC-ACP".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:
   1. Section 09 51 00 - Acoustical Ceilings.
      Section 09 58 00 - Integrated Ceiling Assemblies.

D. The Acoustical Tile Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Section 09 21 16 - Gypsum Board Assemblies: soffit construction.
   2. Section 09 84 30 - Acoustic Wall and Ceiling Units: acoustic diffusing panels for installation within acoustic ceiling grids.
   3. Section 09 91 23 - Interior Painting: finishing of soffits and hard ceilings.
   4. Section 11 40 00 - Foodservice Equipment.
   5. Section 11 52 13 - Projection Screens: for recessed installation at acoustic ceilings.
   6. Section 12 24 00 - Window Shades.
   7. Division 21: Fire Suppression sections.
   8. Division 23: HVAC sections.
   9. Division 26: Electrical sections.
   10. Division 27: Communications sections.
   11. Division 28: Electronic Safety and Security sections.

E. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

F. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Bidder shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.

G. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

H. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Cutting and Patching:
   1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical sections. Where any of the sections listed as part of this Trade Bid indicate that cutting and coring shall be performed by parties other than the Acoustic Ceilings Trade Contractor, the cost of such cutting and coring necessary for the work of this section shall be borne by the Acoustic Ceilings Trade Contractor.

2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
4. Any and all cutting of structural members, including floor slabs, shall require approval of the structural engineer of record; see Structural Drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those indicated on Structural Drawings, obtain approval from the structural engineer of record.
5. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for reference standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See each individual technical specification section listed above for product information, samples, shop drawings, and other submittals required.

1.06 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.07 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for general requirements for mock-ups.

1.08 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, the Acoustic Ceilings Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Acoustic Ceilings Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.09 WARRANTY

A. See each individual technical specification section referenced above for warranty requirements.

B. See Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

2.01 CLEANING

A. Acoustic Ceilings Trade Contractor shall be responsible for cleaning up Acoustic Ceilings Trade Contractor's own work at the end of each day, and depositing waste and debris created by Acoustic Ceilings Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters

shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

SECTION 09 00 05
RESILIENT FLOORING TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1 through 8, 10, and 11, inclusive, as most recently amended.

B. Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid deposit specified therein.

C. Every Trade Bid for work under this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Resilient Flooring Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the Resilient Floors subcontractor or an entity engaged by the subcontractor, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this Trade Bid Section shall include all furnishing and installation of resilient flooring for the project, as shown on the drawings, as described in the specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 09 00 05 or the abbreviation "SC-RESFL".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:
   1. Section 09 65 00 - Resilient Flooring.

D. The work of this Trade Bid Section shall include part of the scope of each of the following sections:
   1. Section 03 54 00 - Concrete Toppings: Self-leveling underlayment applied to concrete slabs, for areas to receive resilient flooring.

E. This Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Section 03 30 00 - Cast-in-Place Concrete: Cast-in-place concrete substrate surface and joint locations.
   2. Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete.
   3. Section 04 20 00 - Unit Masonry: substrate surfaces to receive wall base.
   4. Section 05 51 00 - Metal Stairs: stairs to receive resilient flooring, treads, and risers.
   5. Section 05 53 05 - Metal Gratings and Floor Plates: metal plate covers to receive resilient flooring.
   6. Section 05 73 00 - Decorative Metal Railings: integration of flooring with rails and components to receive base.
   7. Section 06 41 00 - Architectural Wood Casework: casework installation and application of resilient base.
   8. Section 08 11 13 - Hollow Metal Doors and Frames: base applied to sidelight framing.
   9. Section 08 43 13 - Aluminum-Framed Storefronts: base applied to framing.
   10. Section 08 44 13 - Glazed Aluminum Curtain Walls: base applied to framing.
   11. Section 08 71 00 - Door Hardware: coordination / interface of flooring with door saddles and thresholds.
   12. Section 09 21 16 - Gypsum Board Assemblies: substrate surfaces for wall base.
   13. Section 09 30 00 - Tiling: interface of resilient flooring and tile flooring; transitions and stone saddles.
   14. Section 09 64 66 - Wood Athletic Flooring: interface of resilient flooring and wood athletic flooring.
   15. Section 09 66 23 - Thin Set Epoxy Terrazzo Flooring: interface of resilient flooring and resinous matrix terrazzo flooring.
   16. Section 09 67 00 - Fluid-Applied Flooring: interface of resilient flooring and fluid-applied flooring.
   17. Section 09 68 13 - Tile Carpeting: interface of resilient flooring and tile carpeting.
   18. Section 09 91 23 - Interior Painting.
   19. Section 10 51 13 - Metal Lockers : application of base to fixed lockers.
   20. Section 12 32 00 - Manufactured Wood Casework: application of base to casework.
   21. Section 12 35 53.15 - Music Education Storage Casework: application of base to casework.
   22. Section 12 48 13 - Entrance Floor Mats and Frames: interface of resilient flooring and entrance mats and frames.
   23. Section 14 24 00 - Hydraulic Elevators.

F. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

G. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.

2. This Trade Biddershall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.

H. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing laws and codes.
1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

J. Cutting and Patching:
1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical sections. Where any of the sections listed as part of this Trade Bid indicate that cutting and coring shall be performed by parties other than the Resilient Flooring Trade Contractor, the cost of such cutting and coring necessary for the work of this section shall be borne by the Resilient Flooring Trade Contractor.
2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
4. Any and all cutting of structural members, including floor slabs, shall require approval of the project's structural engineer of record; see Structural Drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those indicated on Structural Drawings, obtain approval from Structural Engineer of Record.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for referenced standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. See each individual technical specification section listed above for required product information, samples, shop drawings, and other submittals required.

1.06 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.
B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.07 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for general requirements for mock-ups.

1.08 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, the Resilient Flooring Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Resilient Flooring Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.09 WARRANTY

A. See each individual technical specification section listed above for warranty requirements.

B. See Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS)

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

3.01 CLEANING

A. Resilient Flooring Trade Contractor shall be responsible for cleaning up Resilient Flooring Trade Contractor' own work at the end of each day, and depositing waste and debris created by Resilient Flooring Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

SECTION 09 00 06
TERRAZZO TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Terrazzo Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1 - 8, 10, and 11, as most recently amended.

B. Trade Contract shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid bond specified therein.

C. Every Trade Contract for work of this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Terrazzo Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the Terrazzo subcontractor or an entity engaged by the Construction Manager, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch, who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this Trade Bid Section shall include all furnishing and installation of terrazzo systems for the project, as shown on the drawings, as described in the specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not necessarily exclusively) shown on the drawings by the section number 09 00 06 or the abbreviation "SC-TERR".

C. The work of this Trade Contract Section shall include the scope of each of the following sections in their entirety:

1. Section 09 66 23 - Thin Set Epoxy Terrazzo Flooring.

D. The work of this Trade Bid Section shall include part of the scope of each of the following sections:
   1. Section 07 92 00 - Joint Sealants Sealant at control joints within terrazzo work and other joints at terrazzo where shown on drawings.

E. The Terrazzo Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Section 03 30 00 - Cast-in-Place Concrete: Cast-in-place concrete substrate surface and saw-cut joint locations, and remediation of flatness and levelness tolerances in substrate surfaces.
   2. Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete.
   3. Section 05 53 05 - Metal Gratings and Floor Plates: interface of terrazzo and recessed floor grilles.
   4. Section 05 73 00 - Decorative Metal Railings: integration of flooring with rails and components to receive base.
   5. Section 09 21 16 - Gypsum Board Assemblies: Substrate surfaces for wall integral terrazzo base.
   6. Section 09 64 66 - Wood Athletic Flooring: interface of terrazozo and wood athletic flooring.
   7. Section 09 65 00 - Resilient Flooring: interface of terrazzo and resilient flooring.
   8. Section 09 67 00 - Fluid-Applied Flooring: interface of terrazzo and fluid-applied flooring.
   9. Section 09 68 13 - Tile Carpeting: interface of terrazzo and tile carpeting.
   10. Section 10 51 13 - Metal Lockers: interface of terrazzo and locker base.
   11. Section 12 48 13 - Entrance Floor Mats and Frames: interface of terrazzo and recessed entry mats and frames, including thickset mortar beds under entry mats and frames when surrounded by terrazzo as shown on drawings.
   12. Division 22: Plumbing sections, for floor cleanouts.
   13. Division 23: HVAC, for pedestal radiant heat.
   14. Division 26: Electrical sections, for floor-mounted power.

F. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

G. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Bidder shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Bidder must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work

H. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of

this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing Laws and Codes.

1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

J. Cutting and Patching:

1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical sections. Where other sections indicate that cutting and coring of terrazzo to accommodate the work of those sections is to be performed by terrazzo subcontractor, the costs shall be borne by the other section.
2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
4. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

1.04 REFERENCE STANDARDS

A. See each individual technical specification sections listed above for reference standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See each individual technical specification section listed above for required product literature, samples, shop drawings, and other submittals required.

1.06 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.07 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, the Terrazzo Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Terrazzo Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.08 MOCK-UPS

A. See each individual technical specification section listed above for in-place mock-up requirements.

B. See Section 01 40 00 - Quality Requirements for general requirements for mock-ups.

1.09 WARRANTY

A. See each individual technical specification section listed above for warranty requirements.

B. See Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS)

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

3.01 CLEANING

A. Terrazzo Trade Contractor shall be responsible for cleaning up Terrazzo Trade Contractor's own work at the end of each day, and depositing waste and debris created by Terrazzo Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

SECTION 09 00 07
PAINTING TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Painting Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1 through 8, 10, and 11, as most recently amended.

B. Painting Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid bond specified therein.

C. Every Trade Bid for work under this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Painting Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the painting Trade Contractor or an entity engaged by the subcontractor, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark-producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this section includes furnishing and installing all painting and coating systems as shown on the drawings, as described in the specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 09 00 07 or the abbreviation "SC-PAINT".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:
   1. Section 09 91 13 - Exterior Painting.
   2. Section 09 91 23 - Interior Painting.

D. This Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Section 03 30 00 - Cast-in-Place Concrete.
   2. Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete .
   3. Section 03 54 00 - Concrete Toppings.
   4. Section 04 20 00 - Unit Masonry.
   5. Section 05 50 00 - Metal Fabrications.
   6. Section 05 12 00 - Structural Steel Framing.
   7. Section 05 31 00 - Steel Decking.
   8. Section 05 51 00 - Metal Stairs.
   9. Section 05 52 13 - Pipe and Tube Railings.
   10. Section 06 20 00 - Finish Carpentry.
   11. Section 06 41 00 - Architectural Wood Casework.
   12. Section 07 81 00 - Applied Fire Protection.
   13. Section 07 81 23 - Intumescent Fire Protection.
   14. Section 07 84 00 - Firestopping.
   15. Section 07 91 00 - Preformed Joint Seals.
   16. Section 07 92 00 - Joint Sealants: for compatibility of adjacent sealants.
   17. Section 08 11 13 - Hollow Metal Doors and Frames.
   18. Section 09 21 16 - Gypsum Board Assemblies.
   19. Division 21: Fire Protection sections.
   20. Division 22: Plumbing sections.
   21. Division 23: HVAC sections.
   22. Division 26: Electrical sections.
   23. Division 27: Communications sections.
   24. Division 28: Electronic Safety and Security sections.
   25. Division 32: Exterior Improvements sections.

E. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders FILED SUB-BIDS Paragraph, and Section 00 41 02 - Form for Filed Sub-Bid for instructions regarding "Paragraph E" Sub-Sub Bids.

F. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: ____.
   2. This Trade Contractor shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Contractor must include in the List of Primary Drawings:: _____, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.

G. Staging and Scaffolding: The work of this Trade Bid Section shall include all staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

H. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Cutting and Patching:
   1. Where finishes provided by this section require patching necessitated by other sections, the cost of said patching shall be reimbursed to this subcontractor by the section causing the patching work.
   2. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
   3. Any and all cutting of structural members, including floor slabs, shall require approval of the Structural Engineer of Record, see Structural Drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those indicated on Structural Drawings, obtain approval from Structural Engineer of Record.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for reference standards.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. See each individual technical specification section listed above for required product literature, samples, shop drawings, and other required submittals.

1.06 QUALITY ASSURANCE

A. See each individual technical specification section listed above for quality assurance requirements.

B. See Section 01 40 00 - Quality Requirements for additional requirements.

1.07 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to submission of any product submittals, the Painting Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will count toward targeted LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The Painting Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.08 MOCK-UPS

A. See each individual technical specification section listed above for in-place mock-up requirements.
   1. See Section for 01 40 00 - Quality Requirements for general requirements for mock-ups.

1.09 WARRANTY

A. See each individual technical specification section listed above for warranty requirements.

B. See the following for additional warranty requirements:

1. Section 01 70 00 - Execution and Closeout Requirements.
2. Section 01 78 00 - Closeout Submittals.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS)

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS)

3.01 CLEANING

A. Painting Trade Contractor shall be responsible for cleaning up Painting Trade Contractor's own work at the end of each day, and depositing waste and debris created by Painting Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following Gypsum Board Assemblies work:
   1. Metal stud wall framing.
   2. Metal channel ceiling framing.
   3. Acoustic insulation and sealant.
   4. Gypsum sheathing.
   5. Gypsum board.
   6. Gypsum ceiling suspension system.
   7. Spring Isolation ceiling hangers.
   8. Joint treatment and accessories.

1.02 ABBREVIATIONS AND ACRONYMS

A. AISI. American Iron and Steel Institute: www.steel.org.
B. ANSI. American National Standards Institute: www.ansi.org.
C. ASTM. ASTM International: www.astm.org.
D. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov.
E. GA. Gypsum Association: www.gypsum.org.
F. UL. Underwriters Laboratories: www.ul.com.
G. WH. Warnock Hersey: www.intertek.com/marks/wh/.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing.
C. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing.
D. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units.
E. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units.
F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
G. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
I. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
J. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
K. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
L. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
M. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
N. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.

O. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
P. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
Q. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
R. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
S. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing.
T. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units.
U. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
V. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
W. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels.
X. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
Y. ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
Z. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
AA. ASTM E413 - Classification for Rating Sound Insulation.
BB. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
CC. GA-216 - Application and Finishing of Gypsum Panel Products.
DD. GA-226 - Application of Gypsum Board to Form Curved Surfaces.
EE. GA-600 - Fire Resistance and Sound Control Design Manual.
FF. UL (FRD) - Fire Resistance Directory.
GG. UL (GGG) - GREENGUARD Gold Certified Products.
HH. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of gypsum board assemblies with size, location, and installation of service utilities.
B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data:
        a. Provide data on products of this section, including board products, framing and support systems, acoustic sealant, joint treatment products, and accessories.
        b. Provide manufacturer's data on partition head to structure connectors, showing deflection allowed, and coordination with firestopping
    2. Shop Drawings:
        a. Indicate special details associated with fireproofing and acoustic seals.
        b. Indicate proposed locations of control joints, if not shown on drawings.

3. Certificates: Asbestos-free materials.
4. Evaluation Service Reports: Show compliance of grid suspension systems with specified requirements.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
a. Include documentation of:
1) Post-Consumer and Pre-Consumer Recycled Content.
2) Environmental Product Declarations (EPD).
3) Health Product Declarations (HPD).
4) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
5) CAL (CDPH SM) emissions testing compliance of ceilings.

1.06 QUALITY ASSURANCE

A. Single Source Responsibility: furnish all materials of same type from one manufacturer for entire Project. Whenever practical, provide all board products and framing from the same manufacturer.
B. Documents at Project Site: Maintain at the project site a copy of manufacturer's instructions, shop drawings, and reference standard documents containing execution requirements.
C. Coordinate top of wall conditions with firestopping products and systems to ensure compatibility of products with intended deflection track system.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
B. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.
C. Store metal products to prevent corrosion, under cover and above grade.

1.08 FIELD CONDITIONS

A. Do not install gypsum board assemblies when temperature, humidity, or other environmental conditions are detrimental to successful installation, per manufacturer's recommendations.
B. Dispose of and do not install gypsum board materials that become wet.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
1. See PART 3 for finishing requirements.
B. Grid Suspension Systems: Provide grid suspension systems in accordance with ASTM C840 and GA-216 and including an ICC-ES evaluation report for the system.
C. Ceilings:
1. Maximum mid-span deflection of L/240.
D. Wall Surfaces to Receive Tile Finish:
1. Maximum deflection to comply with tile manufacturer's instructions for tile type and size.

2.02 METAL FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.

B. Manufacturers - Metal Framing, Connectors, and Accessories: Subject to compliance with requirements of these Specifications, provide products of one of the following:
   1. ClarkDietrich: www.clarkdietrich.com.
   2. MarinoWARE: www.marinoware.com.
   3. Phillips Manufacturing Co: www.phillipsmfg.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Nonstructural Framing System Components: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
   1. Exception: The minimum metal thickness and section properties of ASTM C645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E72 using assemblies specified by ASTM C754.
   2. Where wall is to receive tile finish, comply with tile manufacturer's recommendations for deflection, where more stringent than stated in this paragraph.
   3. Depth of section: As shown on Drawings.
   4. Flange width: Not less than 1.25 inch.
   5. Runners: U shaped, sized to match studs.
   6. Ceiling Channels: C-shaped.
   7. Furring: Hat-shaped sections, minimum depth of 7/8 inch. Minimum face width of 1.25 inch.
   8. Maximum deflection of wall framing behind tile finish is to be L/360 at five psf, or as indicated by manufacturer's instructions for specified tile type and size.
   9. Resilient Furring Channels: Single or double leg configuration, as shown on drawings; 1/2 inch channel depth.

D. Deflection Track: "C"-shaped profile of depth sufficient to allow fastening of wall studs to track flanges through slotted holes in flanges. Allow for up to 3/4 inch deflection of structure.

E. Non-structural Framing Accessories:
   1. Partial Height Wall Framing Support: Steel stud upstand with integral baseplate for bracing partial-height stud walls with no top connection. Products shall be selected based on wall height and sized / spaced to accommodate design criteria including lateral loads and maximum deflection consistent with those for other interior walls.
      a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
      b. Height: 35-3/4 inches and As indicated on drawings.
      c. Products: Subject to compliance with these specifications, provide products of one of the following:
         1) ClarkDietrich; PonyWall Lite or PonyWall Heavy (based on design condition): www.clarkdietrich.com.
         2) SCAFCO Steel Stud Company: Pony Wall Support: www.scafco.com.
         3) The Steel Network, Inc; MidWall Partial Wall Framing: https://steelnetwork.com.

4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

F. Grid Suspension Systems: Suspension system for gypsum board ceilings shall be a pre-engineered suspended tee grid system consisting of cold rolled steel main and cross tees with hot dip galvanized finish, complying with ASTM A653/A653M. Main tees shall be 1-1/2 inch high by 144 inches long with minimum 1-3/8 inch wide knurled face of fire-rated heavy duty classification. Tees shall be pre-punched for hanger wire holes and cross-tee intersections.
   1. Main tees shall be 1-1/2 inch high by 144 inches long with minimum 1-3/8 inch wide knurled face of fire-rated heavy duty classification. Tees shall be pre-punched for hanger wire holes and cross-tee intersections.
   2. Cross tees shall be 1-1/2 inch high by 48 inches long with minimum 1-3/8 inch wide knurled face. Cross tees shall feature positive locking end tabs to facilitate removal without the need for tools.
   3. Wall track shall be 1-1/2 inch high by 144 inches long by 1 inch wide channel shape with knurled face.
   4. Accessory pieces shall be provided and installed to facilitate a complete installation.
   5. Hanger wire shall be 12 gage, complying with ASTM A641/A641M, spaced maximum 48 inches on center and per UL (FRD) at fire rated assemblies. Locate hangers within 12 inches of splice or transition clip. Do not suspend hanger wires from mechanical, plumbing, or electrical equipment occurring above the ceiling.
   6. Fasteners shall be of type and size as recommended by manufacturer of suspended steel ceiling system.
   7. Structural Classification: Intermediate-duty, when tested in accordance with ASTM A653/A653M.

2.03 BOARD MATERIALS (NOTE: BOARD TYPES MAY APPEAR OUT OF NUMERICAL ORDER)

A. Basis of Design products assume that the building will be fully enclosed before board products are delivered. If it is the Construction Manager’s intent to start board installation before the building is fully enclosed, then the mold resistant version of each product shall be required.

B. GYP BD-1 - Abuse Resistant Board.
   1. Application: Use for vertical surfaces below 10 feet unless other products are specifically identified herein based on location, applied finish, or humidity.
   2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
   3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   4. Soft Body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   5. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
   6. Greenguard Gold Certified (UL (GGG)) product.
   7. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   8. Thickness:
      a. Vertical Surfaces: 5/8 inch.
   9. Paper-Faced Type: Gypsum board as defined in ASTM C1396/C1396M.
   10. Glass Mat-Faced Type: Gypsum board as defined in ASTM C1658/C1658M.
   11. Products: Subject to requirements of these specifications, provide products of one of the following:

a. CertainTeed Corporation; Extreme Abuse Drywall with M2Tech: www.certainteed.com.
b. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Hi-Abuse Gypsum Board: www.goldbondbuilding.com.
c. USG Corporation; Sheetrock Brand AR Firecode X Panels: www.usg.com.
    1) Mold Resistant Product: Sheetrock Mold Tough AR Firecode X.
d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. GYP BD-2 - Gypsum Board: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces above 10 feet above the floor, unless other products are specifically indicated in this specification section based on location, applied finish, or humidity.
2. At assemblies Indicated with Fire-Resistance Rating: Use Type X board, UL or WH listed.
3. Greenguard Gold Certified (UL (GGG)) product.
4. Thickness:
    a. Vertical Surfaces: 5/8 inch.
5. Products: Subject to requirements of these specifications, provide products of one of the following:
    a. CertainTeed Corporation; Type X Drywall: www.certainteed.com.
        1) Mold Resistant Product: Gypsum Board with M2Tech.
    b. Georgia-Pacific Gypsum; ToughRock Fireguard X: www.gpgypsum.com.
        1) Mold Resistant Product: ToughRock Fireguard X Mold Guard.
    c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board: www.goldbondbuilding.com.
        1) Mold Resistant Product: Same as above.
    d. USG Corporation; Sheetrock Brand Firecode X Panels: www.usg.com.
        1) Mold Resistant Product: Sheetrock Brand Mold Tough Firecode X.
    e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

D. GYP BD-3 - Mold and Abuse Resistant Products:
1. Application: Use for vertical surfaces and horizontal surfaces at rooms subject to moderate moisture or humidity not indicated to receive tile finish, unless otherwise indicated.
2. Paper-faced products as defined by ASTM C1396/C1396M. Glass-mat-faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board provided the board receives a Level 5 finish.
3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
4. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M, with applied primer and paint finish.
5. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
6. Soft Body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
7. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly. If no tested assembly is indicated, use Type X board, UL or WH listed.
8. Thickness:

a. 5/8 inch.

9. Greenguard Gold Certified (UL (GGG)) product.
10. Products: Subject to requirements of these specifications, provide products of one of the following:
    a. CertainTeed Corporation; Extreme Abuse with M2Tech: www.certainteed.com.
    b. Georgia-Pacific Gypsum; DensArmor Plus Fireguard AR: www.gpgypsum.com.
    c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond Hi-Abuse Brand XP Board: www.goldbondbuilding.com.
    d. USG Corporation; Sheetrock Brand Mold Tough Firecode X Panels: www.usg.com.
    e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

E. GYP BD-4 - Impact Resistant Wallboard: Tested to Level 3 soft-body and hard-body impact in accordance with ASTM C1629/C1629M.
1. Application: Use for vertical surfaces up to 10 feet above floor in circulation and common use areas, including but not limited to gymnasiums, auditoriums, cafeterias, entry vestibules, lobbies, corridors, and stairwells, except when other products are specifically identified herein based on location, applied finish, or humidity.
2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
6. Greenguard Gold Certified (UL (GGG)) product.
7. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
8. Paper-Faced Type: Gypsum wallboard, as defined in ASTM C1396/C1396M.
9. Glass Mat-Faced Type: Gypsum wallboard, as defined in ASTM C1658/C1658M.
10. Type: Fire-resistance-rated Type X, UL or WH listed.
11. Thickness: 5/8 inch.
12. Edges: Tapered.
13. Products: Subject to requirements of these specifications, provide products of one of the following:
    a. American Gypsum Company; M-Bloc IR Type X: www.americangypsum.com/#sle.
    b. CertainTeed Corporation; Extreme Impact Resistant Drywall with M2Tech: www.certainteed.com.
    c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Hi-Impact Gypsum Board: www.goldbondbuilding.com.
    d. USG Corporation; Sheetrock Brand Mold Tough VHI Firecode X Panels 5/8 inch: www.usg.com.
    e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

F. GYP BD-7: NOT USED.

G. GYP BD-8 - Cementitious Tile Backing Board for Wet Areas:
1. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

2. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ASTM C1325.
    a. Thickness: 5/8 inch.
    b. Compressive Strength: Greater than 1250 pounds per square inch.
    c. Flexural Strength: Greater than 750 pounds per square inch
    d. Greenguard Gold Certified (UL (GGG)) product.
    e. Products: Subject to requirements of these specifications, provide products of one of the following:
        1) PermaBASE Building Products, LLC provided by National Gypsum Company; PermaBase Cement Board: www.goldbondbuilding.com.
        2) USG Corporation; Durock Brand Glass-Mat Tile Backerboard: www.usg.com.
        3) Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.

H. GYP BD-9 - Flexible Paper-Faced Products:
1. Application: Use for curved surfaces at rooms not subject to high moisture or humidity.
2. At assemblies indicated with fire-rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
3. Thickness: 1/4 inch.
4. Greenguard Gold Certified (UL (GGG)) product.
5. Products: Subject to requirements of these specifications, provide products of one of the following:
    a. Georgia-Pacific Gypsum; ToughRock FlexRoc Gypsum Board: www.gpgypsum.com.
    b. USG Corporation; Sheetrock 1/4 inch Flexible Gypsum Panels: www.usg.com. (Basis of Design)
    c. Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.

I. GYP BD-6 - Interior Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Interior ceilings, unless otherwise indicated.
2. Thickness: 1/2 inch at non-fire-rated ceilings.
3. Edges: Tapered.
4. Humidified Deflection: Less than 5/16 inch.
5. Greenguard Gold Certified (UL (GGG)) product.
6. Products: Subject to requirements of these specifications, provide products of one of the following:
    a. CertainTeed Corporation; Easi-Lite: www.certainteed.com.
    b. Georgia-Pacific Gypsum; ToughRock: www.gpgypsum.com.
    c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond High Strength LITE Gypsum Board: www.goldbondbuilding.com.
    d. USG Corporation; Sheetrock Brand UltraLight Panels: www.usg.com.
    e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

J. GYP BD-5 - Exterior Sheathing and Soffit Board: Sizes to minimize joints in place; ends square cut.
   1. Application: Exterior sheathing and soffits, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
   4. Humidified Deflection: Less than 1/4 inch.
   5. Greenguard Gold Certified (UL (GGG)) product.
   6. Core Type: Regular at non-rated soffits. Type X at exterior walls.
   7. Type X Thickness: 5/8 inch.
   8. Regular Board Thickness: 1/2 inch at framing at 16 inches on center.
   9. Edges: Square.
   10. Products: Subject to requirements of these specifications, provide products of one of the following:
      a. CertainTeed Corporation; GlasRoc Sheathing: www.certainteed.com.
      b. Georgia-Pacific Gypsum; DensGlass Sheathing: www.gpgypsum.com.
      c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Fire-Shield Sheathing: www.goldbondbuilding.com.
      d. USG Corporation; Securock Brand UltraLight Glass-Mat Sheathing: www.usg.com.
      e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

K. Shaftwall and Coreboard: Type X; thick by wide, long edges, ends square cut.
   1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
   2. Paper-Faced Products:
      a. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panels: www.usg.com. (Basis of Design)

2.04 ACOUSTIC ISOLATION CEILING HANGERS

A. Designed specifically for suspended ceiling system applications; rated for weight of ceiling applied to hangers.

B. Type 1: Minimum STC of 60.
   1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. Kinetics Noise Control; IsoGrid: www.kineticsnoise.com.
      b. Mason Industries; WHR: www.mason-ind.com.
      c. Novia Corporation; ARH: www.noviacorp.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Description: Resilient rubber sandwiched between metal washers with 12 gauge wire loops attached to opposing metal washers..
   3. Sound Transmission tested per ASTM E90.
   4. Impact Insulation Test per ASTM E413.
   5. Rated Deflection: 0.18 inches, minimum.
   6. Vertical Load Capacity: 160 pounds.

C. Type 2: Minimum STC of 70.
   1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. Kinetics Noise Control; ICC: www.kineticsnoise.com.
      b. Mason Industries; 30NCC: www.mason-ind.com.
      c. Novia Corporation; SNH: www.noviacorp.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Description: Spring and neoprene isolation hanger.
   3. Sound Transmission tested per ASTM E90.
   4. Impact Insulation Test per ASTM E413.
   5. Rated Deflection: up to 1 inch.
   6. Vertical Load Capacity: 120 pounds, minimum.

2.05 GYPSUM BOARD ACCESSORIES

A. Acoustic Insulation: Mineral wool, see Section 07 21 00 - Thermal Insulation.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant, as specified in Section 07 92 00 - Joint Sealants; do not use solvent-based non-curing butyl sealant. Provide non-hardening, non-skinning, non-migrating sealant for use in conjunction with gypsum board, as recommended by board manufacturer, paintable wherever exposed to view.

C. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
   1. Corner Beads: Low profile reinforced plastic/paper composite shall be used to reinforce all vertical and horizontal external corners.
      a. Products: Subject to compliance with requirements of these specifications, provide products of one of the following:
         1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com.
         2) ClarkDietrich; Strait-Flex Gold: www.clarkdietrich.com
         3) Phillips Manufacturing Co; Everlast Corner Bead: www.phillipsmfg.com
         4) Trim-Tex, Inc; FastEdge Roll: www.trim-tex.com.
         5) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Galvanized J-profile metal trim shall be applied over gypsum edge where partition or ceiling terminates against masonry or other dissimilar material. Hold board away from contact with exterior masonry walls, structural columns and beams and at least 1/4-inch from pipes.
   3. Control Joints: One-piece joint assembly of non-corrosive metal or extruded vinyl with continuous unperforated expansion strip for insertion into joint, and perforated flanges for fastening to face of board. Must comply with ASTM C1047.
      a. Fire-Resistance Rated: 2 hours when joint system tested in accordance with UL 2079.
      b. Products: Subject to compliance with these specifications, provide products of one of the following:
         1) Clark Dietrich: www.clarkdietrich.com.
         2) Phillips Manufacturing Co: www.phillipsmfg.com.
         3) Trim-Tex, Inc; Fire Rated 093V Expansion Bead: www.trim-tex.com.

4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

4. Reveal or Special Edge Trim:
   a. Material: Extruded aluminum alloy 6063-T5 temper.
   b. Finish: Factory primed for field painting.
   c. Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include but are not limited to the following:
      1) Fry Reglet Corp.: www.fryreglet.com.Gordon, Inc.: www.gordon-inc.com.
      2) Gordon Inc: www.gordon-inc.com.
      3) Tamlyn: www.tamlyn.com.
      4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

D. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant. Bugle head type; length 1-1/4 inch minimum, or longer when necessary to comply with fire rated assembly design. Provide zinc-coated corrosion resistant screws at GYP BD-8 and rooms subject to high humidity.

E. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant. Bugle head type; length 1-1/4 inch minimum, or longer when necessary to comply with fire rated assembly design. Provide zinc-coated corrosion resistant screws at GYP BD-8 and rooms subject to high humidity.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence:
   1. Comply with requirements of Section 01 40 00 - Quality Requirements.
   2. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, surfaces, substrates, structural support, utilities, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are ready to receive work.
      b. Verify that gypsum board materials are not wet, moisture damaged, or mold damaged prior to installation. Remove and replace nonconforming materials.
      c. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of the work of this section constitutes acceptance of conditions.

3.02 INSTALLATION GENERAL

A. Install Gypsum Board Assemblies according to drawings, submittals, manufacturer's instructions, UL (FRD) Listed Assembly requirements, and as follows:
   1. Install acoustic insulation as indicated prior to gypsum board unless readily installed after board has been installed.
   2. Cutting: Board shall be cut scoring and breaking or by sawing, working from face side. Where board meets projecting surface, scribe neatly.
   3. Isolation: Where partitions abut ceiling or deck construction or vertical structural elements, provide slip joint between metal framing and structure to prevent transfer of structural loads or movements.

4. Partition Height: Unless otherwise indicated, extend all partitions through to structural deck above.
5. Sound Rated Applications: Comply with requirements indicated by manufacturer to achieve required ratings as proven by their certified laboratory test results.
6. Fasten all moisture resistant gypsum board types with zinc coated screws.
7. Protect HVAC equipment, vents, light fixtures, and other exposed equipment and appurtenances, to prevent dust and debris from installation and sanding of gypsum board assemblies from entering.

3.03 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.

3.04 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C1007AISI S220 and manufacturer's instructions.
B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Install bracing at exterior locations to resist wind uplift.
C. Studs: Space studs as indicated. Secure in place with a minimum of two screws at each connection.
   1. Extend partition framing to structure in all locations.
   2. Comply with applicable height and lateral pressure span limitations of stud sizes and gages, for each application.
   3. Lay out location of each wall. Install all framing plumb and true to line
   4. Secure all tracks at 24 inch on center maximum and within six inches of each end.
   5. Provide double studs on each side of openings and wall intersections. Secure studs to each other with screws.
   6. Provide pony wall bracing at partial height walls that do not extend to the ceiling or structure above.
   7. Install jack studs, double-headers and sill above and below all openings.
   8. Install blocking and steel plate reinforcement where required for other trades and wall mounted items. Refer to drawings and coordinate with applicable trades.
   9. Install horizontal bracing for exterior walls.
   10. Bracing at Chase Walls: Provide bracing between rows of studs at every other stud, not over four feet on center vertically.
   11. Leave framing ready for application of covering materials.
D. Openings: Reinforce openings for weight of doors or operable panels, using not less than double studs at jambs.
E. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
   1. Orientation: Vertical, unless otherwise indicated on drawings.
   2. Spacing: At 16 inches on center.
F. Acoustic Furring: Install resilient channels at spacing indicated on drawings, but not more than 24 inches on center. Locate joints over framing members.
G. Furring for Fire-Resistance Ratings: Install to comply withf fire-resistance ratings indicated and to GA-600 requirements.

3.05 INSTALLATION OF GYPSUM CEILING SUSPENSION SYSTEM

A. Examine areas to receive materials for conditions that will adversely affect installation. Provide written notification of unacceptable conditions prior to starting work. Do not begin installation until unsatisfactory conditions are resolved.

B. Verify work above ceiling suspension system is complete and installed in a manner which will not affect the layout and installation of the suspension system components.

C. Install system in accordance with ASTM C636/C636M, manufacturer's current printed recommendations, and in compliance with state building code.

D. Non Fire Rated System:

1. Main tees: Installed 48 inches on center, by direct suspension from existing structure, with not less than 12 gage hanger wires spaced 48 inches on center. along main tee length. Wrap hanger wires tightly three full turns at each end. Main tees installed straight, true to line, and at proper elevation.
2. Cross tees: Installed perpendicular to main runners 24 inches on center. and adjacent to each un-supported side of recessed fixtures.
3. Wall track: Installed on vertical surfaces, intersecting suspension components, by method in accordance with manufacturer's written instructions and industry accepted standards.
4. Additional hanger wires: Wrapped tightly three full turns to structure and component at locations where imposed loads could cause deflection exceeding 1/360 span.
5. Diagonal hanger wire splay bracing in conformance with seismic requirements of state building code.

3.06 BOARD INSTALLATION

A. Comply with ASTM C840 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

1. Provide board of thickness shown and not less than minimum recommended by manufacturer or by code for application shown.
2. Apply board first to ceilings at right angles to framing members, then to walls. Boards of maximum practical length shall be used so number of end joints are kept to absolute minimum. Bring boards into contact with each other but do not force into place. Install setting type joint compound at abuse resistant and impact resistant gypsum board walls to meet manufacturer's recommendations.
3. Leave rough openings required for installation of other trades. Board joints at openings shall be located so that no end joint will align with edges of openings unless control joints will be installed at these points. End joints shall be staggered and joints on opposite sides of partition shall not occur on the same side.
4. Board shall be held in firm contact with framing member while fasteners are being driven. Fastening shall proceed from center position of board toward edges and ends. Fasteners shall be set with heads slightly below surfaces of board. Take care to avoid breaking face paper of board.

B. Single-Layer Nonrated: Install gypsum board perpendicular to framing, with ends and edges occurring over firm bearing.

1. Offset edges of boards at least one stud space on opposite faces of partitions/walls.

C. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.

1. Seal joints, cut edges, and holes with water-resistant sealant.

D. Cementitious Backing Board: Install over steel framing members behind all fields of tile or porcelain panels more than one tile course in any direction, in accordance with manufacturer's instructions using zinc-coated fasteners.

E. Installation on Metal Framing: Use screws for attachment of gypsum board.
F. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.
G. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

3.07 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and, at locations shown, and in accordance with the following whether located in drawings or not:
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long, whether or not shown on drawings. Submit proposed locations of joints if not shown on drawings.
   2. At exterior soffits, not more than 30 feet apart in both directions, whether or not shown on drawings. Submit proposed locations of joints if not shown on drawings.
B. Corner Beads: Install at external corners, using longest practical lengths.
C. Reveal and Special Edge Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.
   1. Install unjointed lengths wherever possible.
   2. Provide face width of finished edge reveal trim to fully conceal unfinished edges of gypsum board, framing, and blocking. Verify widths needed with other trades and provide widths needed if they differ from details.

3.08 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
C. Tape and finish gypsum board in accordance with manufacturer's published instructions, levels defined in ASTM C840, as follows:
   1. All joints, fastener heads, trim accessories and surface defects shall be filled with joint compound in accordance with manufacturer's recommendations for a smooth, flush surface, with no visible defects after application of field-applied decoration.
   2. Level 5: Walls and ceilings to receive gloss, semi-gloss, enamel, or epoxy paint finishes,, wallcoverings, and other areas specifically indicated on drawings.
      a. Joints and interior angles shall be taped as in Level 2, with two separate coats of joint compound.
      b. Spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
      c. The Level 5 finish is required to achieve the highest degree of quality by providing a uniform surface and minimizing the possibility of joint telegraphing and/or fasteners "bumping through" the final decoration.
   3. Level 4: Walls and ceilings to receive paint finish, unless otherwise indicated.
      a. Joints and interior angles shall be taped as in Level 2, with two additional coats of joint compound.
      b. Corners, joints, accessories, and fasteners shall be coated with three separate coats of joint compound.
      c. Joint compound shall be smooth and free of tool marks and ridges.
      d. Provide Level 5 finish at surfaces indicated to receive gloss, semi-gloss, enamel, and epoxy paints.
   4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
      a. Joints and interior angles shall have tape embedded in joint compound.

b. Surfaces shall be free of excess joint compound. Accessories and fasteners shall be covered by one separate coat of joint compound.
c. Tooled finish with thin skim of compound above tape at time of tape embedment shall be considered a separate coat, otherwise, apply additional coat of compound over tape to meet Level 2 requirement.

5. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
   a. Joints and interior angles shall have tape set in joint compound.
   b. Surfaces shall be free of excess joint compound.
   c. Tool marks and ridges are acceptable.
   d. Tape and fastener heads do not need to be covered with joint compound.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.09 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Remove, repair and reinstall or restore in place damaged items prior to inspection for Substantial Completion.
   1. Remove all twisted and damaged or otherwise defective framing, replace with new framing.
   2. Replace board work that cannot be repaired to conceal defects.
   3. Finish touch-up damaged surface finishes.
   4. Replace damaged materials and components with new if repair not acceptable to Architect.

3.10 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Engage waste management "Extended Producer Responsibility" or take-back programs with manufacturers.
   1. Construction Manager shall ensure responsibilities, field procedures, and site separation meet requirements of LEED for Schools v4/v4.1 Construction and Demolition Waste Management credits.

3.11 PROTECTION

A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 TRADE BID CONTRACT REQUIRED

A. The work of this section shall be included in the Tile Trade Bid. See Section 09 00 02 - Tile Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following work:
   1. Tile for floor applications.
   2. Tile for wall applications.
   3. Accessories and equipment required for a complete installation including, but not limited to:
      a. Ceramic accessories.
         1) Ceramic trim.
         2) Non-ceramic trim including metal trim accessories at terminations and transitions.
      b. Waterproofing and anti-fracture membranes.
      c. Self-leveling underlayments, flash patching, and fillers for repair of localized surface defects as identified by manufacturer or installer as unacceptable as a substrate for floor or wall tile installation.
      d. Mortar.
      e. Grout.
      f. Coatings.
      g. Tile expansion and movement joints.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute: www.ansi.org.
B. ASSP. American Society of Safety Professionals: www.assp.org.
C. ASTM. ASTM International: www.astm.org.
D. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov/.
E. ISO. International Organization for Standardization: www.iso.org.
F. TCNA. Tile Council of North America, Inc: www.tileusa.com.

1.04 REFERENCE STANDARDS

A. Editions of listed standards shall be as referenced by applicable codes, or most current edition if not referenced.
B. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).
C. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
D. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar.
E. ANSI A118.5 - American National Standard Specifications for Chemical Resistant Furan Mortars and Grouts for Tile Installation.
F. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
G. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
H. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar.

I. ANSI A137.1 - American National Standard Specifications for Ceramic Tile.
J. ANSI/ASSP A1264.2 - Reducing Slip Missteps on Walking-Working Surfaces.
K. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products.
L. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
M. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation.
N. TCNA (HB-GP) - Handbook for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs Installation.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination as follows:
1. Section 06 41 00 - Architectural Wood Casework: for wood vanity and countertop installation at tile floors and walls.
2. Section 09 21 16 - Gypsum Board Assemblies: for wall surfaces to receive waterproofing and tile finish.
3. Section 09 67 00 - Fluid-Applied Flooring: for material thickness and transition strips
4. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: Coordinate installation of accessories into wall tile.
5. Section 10 51 13 - Metal Lockers: Coordinate installation with tile flooring.
6. Section 12 32 00 - Manufactured Wood Casework: for casework installation at tile floors and walls.
7. Section 12 36 00 - Countertops: for installation of countertops and splashes at tile walls.
8. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.
a. Refer to Section 01 70 00 - Execution and Closeout Requirements for pre-installation meeting requirements.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
1. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, sealant, and accessories. Include instructions for using grouts and adhesives.
a. Include product data on finishes, protective coatings, use limitation, and recommendations.
b. Submit schedule of proposed installation methods for each room and application according to the TCNA (HB).
2. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
3. Installer's qualification statement.
a. Submit documentation of completion of apprenticeship and certification programs, for each laborer installing materials of this section.
4. Specimen warranties.
C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional

prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Tile Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Environmental Product Declarations (EPD).
        3) Health Product Declarations (HPD).
        4) VOC content and CAL (CDPH SM). Emissions testing compliance of adhesives and sealants.
        5) CAL (CDPH SM). Emissions testing compliance of flooring.

D. Closeout Submittals
1. Submit in accordance with the following sections:
    a. 01 70 00 - Execution and Closeout Requirements.
    b. 01 78 00 - Closeout Submittals.
2. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. See Section 01 60 00 - Product Requirements, for additional provisions.
    b. Extra Tile: 2 percent of each size, color, and surface finish combination.
4. Warranty Documentation: Submit manufacturer's tile and system warranties and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Installer Qualifications:
1. Ceramic Tile Education Foundation (CTEF): Certified Tile Installer (CTI).
2. Apprenticeship Program: Installer has achieved Journeyworker status through an apprenticeship from the International Union of Bricklayers and Allied Craftworkers (IUBAC) or a U.S. Department of Labor (DOL)-recognized program.
3. Advanced Certifications for Tile Installers (ACT): Certification in installation of membranes, mortar bed (mud) floors, mortar (mud) walls, shower receptors, large format tile, gauged porcelain tile/panels/slabs, and grouts.

B. Single Source Responsibility:
1. Obtain each type and color tile material required from single source.
2. Obtain setting and grouting materials from one manufacturer to ensure compatibility and warranty requirements are met.
3. Obtain prefabricated edge protection and transition and movement profiles from one manufacturer to ensure compatibility.
4. Obtain membrane from same manufacturer as setting material or from manufacturer approved by setting material manufacturer to ensure compatibility and warranty requirements are met.

C. Tile Assembly: This Trade Contractor's attention is directed to the WARRANTY requirements of this section, which require a tile system warranty. All materials selected for mortar, adhesives, grouts, and other materials affecting this requirement shall be products meeting the warranty requirements when used together as an installation system.

1.08 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Comply with the following:

1. Manufacturer's instructions and recommendations, including protection of adhesives from freezing or overheating.
2. The TCNA (HB).
3. Section 01 60 00 - Product Requirements.

1.09 FIELD CONDITIONS

A. Ambient Conditions: Verify ambient and substrate temperatures are within manufacturer's accepted range. Notify Construction Manager immediately if conditions are not acceptable to begin work, so as not to delay the progress.

1.10 WARRANTY

A. Manufacturer / Special Warranty:

1. Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
2. Tile Assembly: Provide a written 25-year minimum full system warranty that each tile assembly used is free from manufacturing defects and that the component products will not break down or deteriorate when installed in accordance with the manufacturer’s written specifications and guidelines. Warranty shall be issued upon completion of the work and shall begin on the date of Substantial Completion.
3. Tiles: Provide manufacturer's standard material warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile: Subject to compliance with these specifications, provide products of one of the following:

1. Creative Materials Corporation: www.creativematerialscorp.com.
2. Dal-Tile Corporation: www.daltile.com.
3. Porcelanosa Grupo; www.porcelanosa.com/us/.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Setting Materials: Subject to compliance with these specifications, provide products of one of the following:

1. ARDEX Engineered Cements: www.ardexamericas.com.
2. Custom Building Products: www.custombuildingproducts.com.
3. LATICRETE International, Inc: www.laticrete.com.
4. Mapei Corporation: www.mapei.com.
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE REQUIREMENTS

A. All tile flooring installation shall comply with applicable accessibility codes and standards, including but not limited to accessible route requirements for threshold heights, ramped conditions, transitions, and slip resistance.

1. Tile Flooring Surfaces: Static Coefficient of Friction per ANSI/ASSP A1264.2.

B. Manufactured tile shall conform with ANSI A137.1 with respect to abrasive wear, water absorption, bonding capability, thickness, facial dimensions, facial warpage, wedging, crazing, breaking strength and thermal shock, unless otherwise indicated in these specifications.

C. Provide materials manufactured under TCNA license to ensure consistent quality and compatibility.

2.03 TILE

A. See drawings for basis of design tile products, sizes, and types.

B. Ceramic Mosaic Tile (colorbody porcelain), TILE-1: ANSI A137.1 standard grade.
   1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   2. Sizes, shapes, surface finishes, colors, and patterns: As shown on drawings.
   3. Edges: Cushioned.

C. Glazed Wall Tile, : ANSI A137.1 standard grade.
   1. Moisture Absorption: 7.0 to 20.0 percent as tested in accordance with ASTM C373.
   2. Size, surface finish, color(s) and pattern(s): As indicated on drawings;
   3. Edges: Cushioned.

D. Porcelain Tile, TILE-3, TILE-4: ANSI A137.1 standard grade.
   1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   2. Sizes, shapes, thicknesses, surface finishes, colors, and patterns as shown on drawings. Same manufacturer as for tile.
   3. Edges: Cushioned.
   4. Trim Units: Matching shapes as indicated on drawings, in sizes coordinated with field tile.

2.04 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Barrier-free compliant., type and dimensions to suit application and as indicated on drawings, for setting using tile mortar or adhesive.
   1. Finish for floor profiles: Satin natural anodized extruded aluminum.
   2. Finish for wall profiles: brushed stainless steel.
   3. Applications:
      a. Open edges of wall and floor tile.
      b. Inside and outside wall corners.
      c. Transition between floor finishes of different heights.
      d. Thresholds at door openings.
      e. Borders and other trim as indicated on drawings.
   4. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. Blanke Corporation; Blanke - Trims and Profiles: www.blankecorp.com.
      b. DTA USA Group, Inc: www.dtausagroup.com.
      c. Great Lakes Tile Products: www.gltileproducts.com.
      d. Schluter-Systems: www.schluter.com.
      e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   5. Basis of Design Products: Schluter-Systems:

Application:	Basis of Design Product:
Border profile for decorative designs between field tile and 3D tile.	Schluter Designline brushed nickel anodized aluminum (ATGB)
Open edge of wall tile: Square profile.	Schluter QUADEC
Outward corners in wall tile: Square profile.	Schluter QUADEC
Inward corners in wall tile (where indicated): Coved profile.	Schluter DILEX

2.05 SETTING MATERIALS

A. Provide all tile setting materials, including but not limited to mortars, adhesives, bond coats, primers, waterproofing membranes, decoupling membranes, antifracture membranes, grout, grout sealer, and sealants from the same manufacturer and included in the required tile system warranty.

B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
   1. At elevated slabs provide bond coat approved and warranted for use on above-grade floor slabs subject to deflection.

C. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.

2.06 GROUTS

A. Provide all tile setting materials, including but not limited to mortars, adhesives, bond coats, primers, waterproofing membranes, decoupling membranes, antifracture membranes, grout, grout sealer, and sealants from the same manufacturer, and included in the required tile system warranty.

B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
   1. Applications: for use at all tile installations unless a different type of grout is indicated.
      a. At commercial kitchen food preparation and related storage spaces, provide chemical resistant epoxy grout with 100 percent resistance to oleic acids, exceeding the testing requirements of ANSI A118.5.
   2. Color(s): As indicated on drawings.

2.07 MAINTENANCE MATERIALS

A. Wax coating to protect tile from staining during installation of pigmented or furan grout installation: tiling system manufacturer's recommended product.

2.08 ACCESSORY MATERIALS

A. Provide all tile setting materials, including but not limited to mortars, adhesives, bond coats, primers, waterproofing membranes, decoupling membranes, antifracture membranes, grout, grout sealer, and sealants from the same manufacturer and included in the required tile system warranty.

B. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
   1. Crack Resistance: No failure at 1/8 inch gap, minimum.
   2. Fluid or Trowel Applied Type:
      a. Material: Synthetic rubber.
      b. Thickness: 20 mils, maximum (wet film).

C. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
   1. Fluid or Trowel Applied Type:
      a. Material: Synthetic rubber with polyester fabric reinforcing at edges, corners, joints, and cracks.
      b. Thickness: 25 mils, minimum, dry film thickness.

D. Reinforcing Mesh: 2 by 2 inch size weave of 16/16 wire size; welded fabric, galvanized.

E. Self-Leveling Underlayment: Quick-setting, hydraulic cement underlayment: polymer-modified, self-leveling product meeting the requirements of ANSI A118.12 and Section 03 54 00 - Concrete Toppings.

F. Expansion Joints:
   1. Field-Formed Expansion Joints: Metal tile trim profiles with joint sealant filler as indicated on drawings.

a. Use where indicated in drawings.
b. Width of sealant joint to match typical tile grout joint width.
c. Sealant color to match grout color.

2. All Other Locations: Flexible and compressible back-up strip of closed cell foam polyethylene, butyl rubber, or open cell and closed cell polyurethane, rounded at surface to contact sealant, as shown on details and as recommended by sealant manufacturers. Fit neatly, without compacting, and to a height to allow a sealant depth of half of joint width. Sealant must not bond to back-up material.
3. Width: to approximate grout joints.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions per 01 40 00 - Quality Requirements and as follows:
1. Carefully examine installation areas with installer / applicator present, for compliance with requirements affecting work performance.
2. Verify subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive tile.
a. Flatness for floors: 1/4 inch in 10 feet and 1/16 inch in 1 foot from the required plane.

B. Verify wall surfaces are smooth and flat within tolerances specified for that type of work, are dust-free, and are ready to receive tile.
1. Flatness for walls: 1/4 inch in 8 feet.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Preinstallation Testing: Test substrate surfaces to verify that bond is not impaired. Abrade, treat, or otherwise prepare surface to ensure bonding using manufacturer recommended methods.
1. Do not install tile until Owner-engaged independent testing agency testing results show:
a. Where slab moisture vapor reduction admixtures are not specified in other sections, moisture emission rate and alkalinity requirements of slabs are within tile setting system manufacturer's acceptable ranges or tolerances.
2. If concrete is found to be unacceptable substrate for tile work, the Tile Trade Contractor shall notify Construction Manager. Construction Manager shall make repairs to meet the recommendations of the tile and setting material manufacturer. TheTile Trade Contractor shall not continue with work until substrate is acceptable to the manufacturer of tile and setting materials. Commencement of installation constitutes acceptance of surfaces.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Surface preparation: Refer to manufacturer's instructions and recommendations for preparation of substrates.
1. Vacuum clean surfaces and damp clean.
2. Seal substrate surface cracks with filler.

B. Apply self-leveling underlayment to existing substrate surfaces to provide acceptable flatness tolerance and where indicated on drawings or specified herein.

C. Blending: For tile exhibiting color variations within ranges selected during sample submittals, verify that tile has been factory blended to include full range within each carton. If not, then blend tile on site prior to setting tile.

D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

E. Apply MVE system to slabs where indicated on drawings and required by slab moisture vapor emissivity and alkalinity conditions.

F. Preparation for expansion joints:
   1. Edges shall be clean and dry. Sand or grind for optimum bond.
   2. Apply primer on edges when recommended by sealant manufacturer. Keep primer off face of tile.

3.03 INSTALLATION - GENERAL

A. Lay tile to pattern indicated on drawings. Do not interrupt tile pattern through openings.

B. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base, and wall joints.

C. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

D. Form internal angles square and external angles with specified metal trim profiles, or with bullnose tile trim if no metal trim is specified.

E. Install non-ceramic trim in accordance with manufacturer's instructions.

F. Sound tile after setting. Replace hollow sounding units.

G. Keep control and expansion joints free of mortar, grout, and adhesive.

H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

I. Where anti-fracture / cleavage membrane is specified, apply membrane throughout the spaces.

J. Ensure that cut edges are clean before installing tiles, fit tile carefully against trim, around pipes, electrical boxes and other built in fixtures so that escutcheons, plates and collars will completely overlap cut edges

K. When using glazing tile sheets, minimize tearing sheets apart by drilling pipe holes as much as possible.

L. Expansion joint locations: Per TCNA Guidelines, and as follows:
   1. Where tile abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in backing materials.
   2. All expansion, control, construction, cold, and seismic joints in the structure shall continue through the tile work, including such joints as vertical surfaces.
   3. Joints through tile work directly over structural joints must never by narrower than the structural joint.
   4. Follow TCNA Joint Design Essentials EJ171.

M. Refer to SCHEDULE OF SETTING SYSTEMS at the end of this section.

3.04 INSTALLATION - WATERPROOFING MEMBRANE INSTALLATION

A. Install waterproofing to comply with ANSI A108.10 and waterproofing manufacturer's written instructions, to produce waterproof membrane of uniform thickness bonded securely to substrate.
   1. Provide at all elevated floors containing floor drains

B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

C. Seal waterproofing membrane to floor drain assemblies.

D. Extend floor waterproofing membrane minimum 4 inches up wall surfaces throughout room, and full height of tiled shower alcoves. Extend waterproofing membrane a minimum of 12 inches beyond vertical edges of shower alcoves.

3.05 INSTALLATION - TILE ACCESSORIES

A. Provide metal edge trim at exposed edges of wall tile and all outward corners of wall tile whether shown on drawings or not. Trim to start at top of cove base and extend full height of tile surface. Trim to stop at underside of bullnose tile at top edge of tiled walls when included.

B. Provide metal transition trim at exposed edges of tile floor whether or not indicated in drawings as specified herein. Provide trim in height as appropriate to tile installation thickness and adjacent flooring. Verify trim profiles are compliant with all applicable accessibility rules.

3.06 INSTALLATION - TILE EXPANSION JOINTS

A. Locate tile expansion and movement joints in accordance with TCNA EJ171, including expansion, contraction, isolation, and perimeter, and movement joints as described therein.
   1. All expansion, control, construction, cold, and seismic joints in the structure shall continue through the tile work including such joints as vertical surfaces.
   2. Joints through tile work directly over structural joints must never be narrower than the structural joint.
   3. Install movement joints where tile abuts restraining surfaces such as perimeter walls dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in backing materials.

3.07 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal and the following
   1. Clean tile and grout surfaces as thoroughly as possible upon completion of grouting.
      a. Remove all grout haze, observing tile manufacturer's recommendations as to use of cleaners.
      b. Do not use acids.
      c. Rinse tile work thoroughly with clean water before and after using chemical cleaners.
      d. Polish surfaces of glazed tile work with soft cloth.

3.08 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

B. Do not permit traffic over finished floor surface for four days after installation.

C. Where traffic is unavoidable, cover tiling work with 3/4 inch thick plywood tightly fitted, or equivalent protection.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this Section shall be included in the Acoustic Ceilings Trade Bid. See Section 09 00 03 - Acoustic Ceilings Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following work:
   1. Suspended metal grid ceiling system.
   2. Acoustical units.
   3. Design and installation of intermediate support framing for acoustic “cloud” applications.
   4. Shade pockets in acoustic ceilings.
   5. Support channels and hangers, hanger wire, perimeter moldings, and other accessories required for a complete installation.

B. Acoustical Ceiling Trade Contractor shall provide and coordinate the grid and associated suspended ceiling bracing needed for all equipment and components set into ceiling grid, including but not limited to: radiant heat panels. Contractor(s) responsible for providing the equipment set into ceilings shall install said equipment.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASCE. American Society of Civil Engineers; www.asce.org.

B. ASTM. ASTM International; www.astm.org.

C. CDPH. California Department of Public Health; www.cdph.ca.gov.

D. UL. Underwriters Laboratories; www.ul.com.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

C. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

D. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

G. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

H. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

I. UL (FRD) - Fire Resistance Directory.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Scheduling shall be per Section 01 32 16 - Construction Progress Schedule, and as follows:

B. Sequence 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.

C. Do not install acoustical units until after interior wet work is dry.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals

1. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, mechanical and electrical items installed in the ceiling, compression-resistant hangers, and other ceiling mounted equipment or devices. Indicate cut tile locations and working points within each space.
2. Product Data: Submit manufacturer's printed product literature including products' standards, acoustical units, suspension system components, finishes, installation instructions, use limitations, and recommendations.
3. Samples: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units.
4. Samples: Submit three samples each, 12 inches long, of suspension system main runner, cross runner, and perimeter molding.
5. Engineering Data: Provide engineering data and shop drawings for intermediate support framing system for “cloud” ceilings. Document loads on roof framing, fastening points, and types of anchorage and connectors. Design shall be signed and sealed by the professional structural engineer licensed in the State of Massachusetts.
6. Installer's qualification statement.
7. Specimen warranty.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Acoustic Ceilings Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Environmental Product Declarations (EPD).
        3) Health Product Declarations (HPD).
        4) CAL (CDPH SM) emissions testing compliance of ceilings.

D. Closeout Submittals
1. Submit in accordance with the following:
    a. Section 01 70 00 - Execution and Closeout Requirements.
    b. Section 01 78 00 - Closeout Submittals.
2. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
        1) See Section 01 60 00 - Product Requirements, for additional provisions.
        2) Extra Acoustical Units: Quantity equal to five percent of total installed, for each tile type and size.
3. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 MOCK-UPS

A. The project scope includes an in-place mockup of each type of tegular ceiling grid.
B. The mock-up assembly shall be constructed, observed, and all corrective actions required by the Architect or Owner shall be completed and mock-up accepted prior to commencing acoustical ceiling.

C. Schedule submittals for products indicated to be used in the mock-up to ensure sufficient time to allow review prior to the scheduled erection of the mock-up. Allow time for resubmittal and review.
D. Following acceptance of submittals for material components and selection of colors provide one mock-up of each tegular ceiling grid type selected, in place for final review by Architect prior to proceeding with the work.
    1. The mock-up shall be constructed full-size, and utilize specified colors and materials.
    2. Demonstrate the anticipated range of materials, workmanship and finish expected.
    3. Accepted mock-ups will be used as standard of comparison for colors and textures, workmanship, and other pertinent details.
    4. Modify and/or replace mock-ups as many times as are necessary to obtain Architect's and Owner's acceptance.
    5. Do not start work until mock-ups are accepted by Architect and Owner.
E. Mockup may remain as part of the work.
F. See Section 01 40 00 - Quality Requirements for additional information and requirements regarding mock-ups.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: Company with a minimum of three years experience specializing in work of the type required by this Section.
B. Single Source Responsibility: Furnish system materials from one manufacturer for entire Project, unless otherwise acceptable to Architect.

1.09 WARRANTY

A. Materials and Workmanship Warranties: Provide ten year panel / 15 year system, and ten year / lifetime system warranty (depending on tile specified) warranties, issued by the manufacturer upon completion of the work and beginning on the date of Substantial Completion.
B. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

1.10 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation, unless otherwise indicated by manufacturer's written recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Units: Subject to compliance with requirements of these Specifications, provide equivalent product from one of the following manufacturers, except where otherwise noted for specific ceiling types below:
    1. Armstrong World Industries, Inc: www.armstrongceilings.com. (Basis of Design)
    2. Certainteed Architectural: www.certainteed.com/ceilings-and-walls.
    3. USG Corporation: www.usg.com/ceilings.
    4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
B. Suspension Systems:
    1. Same as for acoustical units.
    2. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Rating: In accordance with test procedures in ASTM E119 and complying with the following:
   1. Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.

B. Provide acoustical units with a flame spread of 25 or less and smoke development of 50 or less when tested in accordance with ASTM E84, Class 1.

C. Design Components to ensure light fixtures will not induce eccentric loads. Where components may induce rotation of ceiling system components, providing stabilizing reinforcement.

2.03 ACOUSTICAL UNITS (NOTE: ACOUSTICAL UNIT TYPES MAY APPEAR OUT OF NUMERICAL ORDER)

A. Acoustical Units - General: ASTM E1264, Class A.
   1. Passing CAL (CDPH SM) v1.1 or v1.2.

B. Acoustical Panels, Type ACP1: Factory painted mineral fiber, with the following characteristics:
   1. Classification: ASTM E1264 Type A.
      a. Form: A1.2, wet formed.
      b. Pattern: D - fissured.
   2. Size: 24 by 48 inches.
   3. Thickness: 1 inch.
   4. Light Reflectance: .85, determined in accordance with ASTM E1264.
   5. NRC: .85, determined in accordance with ASTM E1264.
   6. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
   7. Panel Edge: _____, lay-in.
   8. Surface Color: White.
   9. Suspension System: Exposed grid.
   10. Basis of Design Product: Ultima High NRC by Armstrong.

C. Acoustical Panels, Type ACP1A: Factory painted mineral fiber, with the following characteristics:
   1. Same as ACP1, except size is 24 by 24 inches.

D. Acoustical Panels, Type ACP1B: Factory painted mineral fiber, with the following characteristics:
   1. Same as ACP1A, except Basis of Design product is Calla, by Armstrong.
   2. Color: Black.

E. Acoustical Panels, Type ACP2: Not Used.

F. Acoustical Panels, Type ACP3: Not Used.

G. Acoustical Panels, Type ACP4: Not Used.

H. Acoustical Panels, Type ACP4A: Mineral fiber with scrubbable finish, with the following characteristics:
   1. Classification: ASTM E1264 Type A.
   2. Size: 24 by 24 inches.
   3. Thickness: 5/8 inch.
   4. Light Reflectance: 89 percent, in accordance with ASTM E1264.
   5. Ceiling Attenuation Class (CAC): 33, minimum, in accordance with ASTM E1264.
   6. Panel Edge: Square.
   7. Color: White.
   8. Basis of Design Product: Kitchen Zone, by Armstrong.

I. Acoustical Panel Canopies, Type ACP6: Glass fiber panels suspended by hanger wire or rods attached to anchor points on panel back.
   1. Classification: ASTM E1264 Type B.

a. Pattern: E - lightly textured.
2. Size and Configuration: As indicated on drawings.
3. Thickness: 7/8 to 1 inch.
4. Light Reflectance: 85-90 percent, in accordance with ASTM E1264.
5. Noise Reduction Coefficient (NRC) Range: 90 to 100, in accordance with ASTM E1264.
6. Ceiling Attenuation Class (CAC): 26, in accordance with ASTM E1264.
7. Panel Edge: square, lay-on.
8. Color: White.
9. Basis of Design Product: Soundscapes Shapes by Armstrong.

J. Acoustical Panels, Type ACP5: Not Used.

K. Linear Wood Ceiling Type WD-1: with the following characteristics:
1. Size: 108 by 6 inch planks, with 2-1/2 inch plank and 3/4 inch fleece.
2. Thickness: 3/4-inch.
3. NRC: 0.60 per ASTM E1264, with acoustical fiberglass infill.
4. Shape: Plank.
5. ASTM Classification: ASTM E1264 - Composite Fire Class A.
6. Texture: Smooth.
7. Composition: Linear wood ceiling planks with wood face veneer applied to 3/4-inch fire retardant core, with black fabric scrim.
8. Edge: Square.
a. All field-cut edges to be sealed with edge band #6408NMP or panel upturns per details.
9. Finish: Plain-sliced maple with custom stain, to match Architect's control sample.
10. Suspension Grid: As recommended by manufacturer compatible with linear panels.
11. Perimeter Edge trim: Manufacturer’s recommended and compatible edge closure trim in finish to match panels.
a. Height: As indicated on Drawings, or if not indicated, six inches.
12. Manufacturers: Subject to compliance with these Specifications, provide one of the following:
a. Armstrong; MetalWorks; www.armstrongceilings.com. (Basis of Design)
b. Hunter Douglas; www.hunterdouglasarchitectural.com.
c. 9Wood; 9wood.com.
d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.04 SUSPENSION SYSTEMS

A. Manufacturers:
1. Same as for acoustical units.

B. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices necessitated by the work.

C. Exposed Suspension System: Formed steel, commercial quality cold rolled.
1. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
2. Profile: Tee; 9/16 inch face width.
3. Finish: Baked enamel.
4. Color: White.
5. Basis of Design Product: Prelude tee suspension system, by Armstrong.

D. Exposed Suspension System: Extruded aluminum.

1. Application(s): Wet areas.
2. Structural Classification: Light-duty, when tested in accordance with ASTM C635/C635M.
3. Profile: Tee; 15/16 inch face width.
4. Construction: Double web.
5. Finish: Baked enamel.
6. Color: White.
7. Basis of Design: Prelude Plus XL Aluminum, by Armstrong.

2.05 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same metal and finish as grid.
   1. Size: As appropriate for installation conditions.
   2. At Exposed Grid: Angle Molding: L-shaped, for mounting at same elevation as face of grid.
   3. At acoustic "cloud" applications and where indicated on drawings: Prefinished aluminum Compasso edge trim by USG, or an Architect-acceptable equivalent.
   4. At ceiling height transitions in sizes and location indicated on Drawings: Compasso by USG, or an Architect-acceptable equivalent.

D. Shade pockets in acoustical ceilings: Three-sided extruded aluminum alloy 6063 perimeter pockets to create transition between perimeter and ceiling plane: aluminum pocket designed to accept commercial quality aluminum t-bar connection clips and galvanized steel splice plates.
   1. Provide shade pockets from same manufacturer as acoustic ceiling system, and compatible with suspension system.
   2. Finish: Baked enamel.
   3. Color: Match color of exposed suspension system.
   4. Sizes: As shown on drawings.
   5. Provide perimeter closure clips where shown on drawings, and per manufacturer's recommendations.
   6. Factory or field cut miters to match approved shop drawings.
   7. Provide manufacturer's building perimeter end plates, to cap ends of perimeter pockets.
   8. Provide manufacturer's recommended foam gaskets, splines, and other accessories for a complete installation.

E. Acoustical Insulation:
   1. As specified in Section 07 21 00 - Thermal Insulation.
   2. Size: To fit acoustical suspension system.

F. Gypsum Board: Fire rated type; 5/8 inch thick, ends and edges square, paper faced.

G. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Comply with requirements of Section 01 40 00 - Quality Requirements.
   1. Carefully examine installation areas with Installer present, for compliance with requirements affecting work performance.
      a. Verify existing conditions before starting work: verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are ready to receive work.

b. Verify that layout of hangers will not interfere with other work.

2. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work of this section constitutes acceptance of substrates.

3.02 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts where required.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. General: Install suspension system in accordance with manufacturer's instructions, drawings, ASTM C636/C636M, and ASCE 7, and as follows:

1. Install suspension systems in accordance with MSBC (780 CMR).
2. Install suspension systems in accordance with UL (FRD) Design Number for roof/ceiling assembly indicated on drawings.
3. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360 o.
   a. Locate system on room axis according to reflected plan.
   b. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
      1) Use longest practical lengths.
      2) Overlap and rivet corners.
4. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
5. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
6. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
7. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
8. Do not eccentrically load system or induce rotation of runners.
9. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.
10. Design and install intermediate steel support system to span between roof framing and provide suspension points coordinated with acoustical ceiling cloud configurations.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. General: Install acoustical units in accordance with manufacturer's instructions, drawings, ASTM C636/C636M, and ASCE 7, and as follows:

1. Install acoustical units systems in accordance with MSBC (780 CMR).
2. Install acoustical units systems in accordance with UL (FRD) Design Number for roof/ceiling assembly indicated on drawings.
3. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
4. Fit border trim neatly against abutting surfaces.
5. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
6. Cutting acoustical units:
   a. Cut to fit irregular grid and perimeter edge trim.

b. Make field cut edges of same profile as factory edges.
c. Double cut and field paint exposed reveal edges.

7. Install hold-down clips on panels within 20 ft of an exterior door.
8. Seal joints only where space above the ceiling will be used as an air plenum, or when required to reduce sound transmission between rooms.
9. Locate ceiling access panels directly under the items that require access, and as indicated on drawings.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Remove, repair and reinstall or restore in place damaged items prior to inspection for Substantial Completion.
   1. Replace damaged materials and components with new if repair not acceptable to Architect.

3.06 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.

3.07 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
C. Following installation, clean dirty discolored surfaces of acoustical units and leave them free of defects.
   1. Replace damaged or abraded components.

3.08 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 09 58 00
INTEGRATED CEILING ASSEMBLIES

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this Section shall be included in the Acoustic Ceiling Trade Bid. See Section 09 00 03 - Acoustic Ceilings Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Suspended, modular, non-fire-rated grid system.
   2. Flat acoustic boards.
   3. Finishing.
   4. Wall angles and all related accessories for a complete system.

B. See Section 10 14 23 - General Signage for sticker signage instructing not to paint integrated ceilings, to maintain ceiling system's acoustical properties. Stickers shall be furnished and installed by signage contractor, inside access panels within integrated ceilings.

1.03 ABBREVIATIONS AND ACRONYMNS

A. AABC - Associated Air Balance Council; www.aabc.com

B. ASTM - American Society for Testing and Materials; www.astm.org.

C. CAL (CDPH) - California Department of Public Health: www.cal.ca.org.

D. UL - UL Solutions, formerly Underwriters Laboratories; www.ul.com.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

C. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

G. ASTM E413 - Classification for Rating Sound Insulation.

H. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

I. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

J. UL (FRD) - Fire Resistance Directory.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide descriptions and characteristics of components, finishes, product limitations.
   2. Shop Drawings: Indicate grid layout and dimensions, junctions with other work, relationship of mechanical and electrical items related to ceiling system, other components in the ceiling assembly.

3. Samples: Submit one acoustical board; one, 12 inch long piece of metal main grid, cross tee, and perimeter trim.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Acoustic Ceilings Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
a. Include documentation of:
1) Post-Consumer and Pre-Consumer Recycled Content.
2) Regional Materials: Extracted, manufactured, and purchased within 100 miles.
3) Environmental Product Declarations (EPD) and Health Product Declarations (HPD).
4) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
5) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.
6) VOC content and CAL (CDPH SM) Emissions testing compliance of ceilings.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operating and Maintenance Data:
a. Submit information on adjusting air supply and return devices.
b. Installer's Qualification Statement.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
a. See Section 01 60 00 - Product Requirements, for additional provisions.
b. Extra Acoustic Panels: Ten.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this Section.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements and submittal instructions and the following:
1. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
a. Acoustical Panels: Manufacturer’s defects in material.
b. Grid System: Rusting and manufacturer's defects.
2. Warranty Period:
a. Acoustical panels: Ten years from date of substantial completion.
b. Suspension: Ten years from date of substantial completion.

1.08 MOCK-UP

A. Construct mock-up of one grid module, 8 feet long by ____ feet wide; include at least one instance of each component of the integrated ceiling system assembly.
B. Locate as indicated on drawings.

C. Mock-up may remain as part of the work.

1.09 FIELD CONDITIONS

A. Do not install system until building is enclosed, above ceiling work is completed, tested, and approved, and dust generating activities have terminated.

B. Do not install acoustical units until after wet work has dried.

C. Maintain minimum temperature of 60 degrees F and maximum relative humidity of 50 percent, 24 hours prior to, during, and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these specifications, provide products of one of the following:

1. Armstrong World Industries, Inc: www.armstrongceilings.com.
    a. Product: AcoustiBuilt Seamless Acoustical Ceiling System.
2. Pending Vetting.
3. Pending Vetting
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 INTEGRATED CEILING ASSEMBLIES

A. Integrated Ceiling Assemblies: Suspension system, panels, trim, and accessories, as indicated and per requirements of specific project conditions, for a complete system.

1. Provide suspension system that rigidly secures ceiling system including integral mechanical and electrical components with maximum deflection of 1/360 of span.

B. Performance Requirements:

1. Fire Rated Ceiling Assembly: UL (FRD) Assembly No. ____ for ceiling and floor assembly, providing one hour rating.
2. Acoustic Board Surface Burning Characteristics: Flame spread/Smoke developed index of ____/____, maximum, when tested in accordance with ASTM E84.
3. System Noise Reduction Coefficient (NRC): ____ minimum measured in accordance with ASTM C423.
4. System Sound Transmission Coefficient (STC): ____, calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
5. Acoustic Board Light Reflectance: ____ percent.

2.03 MATERIALS

A. Acoustic Boards:

1. Size: 48 by 72 inches.
2. Thickness: 7/8 inches, minimum.
3. Composition: Mineral.
4. Light Reflectance: 70 percent.
5. NRC Rating: 0.80.
6. STC Rating: 42.
7. Fire Hazard Classification: Class A.
8. Edge: Tapered.
9. Surface Color: White.
10. Surface Finish: Fine.

2.04 COMPONENTS

A. Grid Design: Modular, flat.

B. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
C. Grid System: ASTM C635/C635M heavy-duty; rolled metal profiles for main and cross runners, die cut and interlocking.
D. Grid Size: 1-1/2 inches wide by 1-11/16 inches high.

2.05 ACCESSORIES

A. Hangers: Galvanized steel wire.
B. Accessories: Structural main and cross beams, stabilizer bars, hanger clips for two, three, and four way intersections, size and type to suit application, seismic requirements.
C. Acoustical Batt Insulation: Specified in Section 07 21 00 - Thermal Insulation.
D. Touch-up Paint: Type and color to match acoustical and grid units.

2.06 FINISHES

A. Joint Compound
    1. Setting Compound: Lightweight setting-type drywall joint compound, Ultra lightweight drying-type drywall joint compound
    2. Joint Tape: Self-Adhesive mesh drywall joint tape (Panel to Panel)
        a. Use Setting Type Compound for initial coats and use Drying Type Compound for final coats per the installation instructions. Do not use any other type of drywall compound such as All-Purpose Compound.
        b. Paper tape at the wall intersection
B. Spray Applied Finish – Required Product: #2605WH Fine Texture Finish for AcoustiBuilt panels, as manufactured by Armstrong World Industries.
    1. Color: White.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that layout of hangers will not interfere with other work.
C. Verify that required utilities are available, in proper location, and ready for use.

3.02 INSTALLATION - GRID SYSTEM

A. Install ceiling system in accordance with manufacturers' instructions.
B. Install ceiling system in accordance with ASTM E580/E580M for seismic design indicated.
C. Install hangers and inserts coordinated with overhead work. Provide additional hangers and supports.
D. Provide hanger clips during steel deck erection. Provide additional hangers and inserts per requirements of specific project conditions.
E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
F. Coordinate position of hangers and carrying channels to accommodate fittings and components placed after installation of grid.
G. Where ducts or other equipment prevent regular spacing of hangers, reinforce adjacent hangers and related support members required to span the distance.
H. Suspend grid independently of walls, columns, ducts, pipes, and conduit. Where grid members are spliced, avoid visible displacement of face plane of adjoining members.
I. Where component installation produces rotation or distortion of runners, provide stabilizer bars or additional support.
J. Install edge moldings at intersection of ceiling and vertical surfaces and penetrations, using components of maximum length, set level. Provide edge moldings at junction with other ceiling finishes. Miter corners. Provide preformed edge closures to match bullnosed cornered partitions.

3.03 INSTALLATION - COMPONENTS

A. Install Acoustic Units:
   1. Free from damaged edges or other defects detrimental to appearance and function.
   2. After above-ceiling work is complete.
   3. In uniform plane, and free from twist, warp and dents.
   4. Cut panels to fit irregular grid and perimeter edge trim.

B. Finished Ceiling: Uniform plane, free of soiled or damaged components that are detrimental to appearance or function of system.

C. Control joints are required following the standards used for gypsum board listed in ASTM C840, Section 20
   1. Ceilings with perimeter relief cannot exceed 50 LF and 2500 SF between control joints.
   2. Ceilings without perimeter relief cannot exceed 30 LF and 900 SF between control joints.

D. Panel joints and fasteners are finished with tape and compound to create a flat surface. While the materials used to finish AcoustiBuilt panels are also used to finish drywall, the procedure has unique requirements.

E. Joint compound coverage shall be limited to preserve the acoustical performance of the panels. Compound at panel joints shall not exceed 8 inch widths. Compound applied to field fasteners shall not exceed 2 inch by 2-inch areas. All compound shall be smooth and free of tool marks and ridges. Panels are to be finished with taping knives. Production tools, including boxes, are detailed on the installation instructions.

F. Sanding and inspection: Throughout the sanding process, inspect the surface frequently for flatness. Direct a light across the ceiling to highlight unevenness that requires attention.

G. Fine Texture Finish shall be applied in four to five coat process (additional coat may be used to achieve the desired finish) as called out in the installation instructions. Fine Texture Finish for AcoustiBuilt is applied in multiple coats, layered to achieve a uniform appearance and acoustical performance. It is strongly encouraged to practice spraying to ensure proper calibration and technique are achieved. Refer to the installation video.
   1. AcoustiBuilt fine texture finish must be sprayed with a Graco Mark V texture system. This equipment properly atomizes the finish for acoustics and aesthetics. Fine texture finish is not intended for use with any other airless paint systems not recommended by Armstrong or to be applied by brush or rolling.
   2. See Manufactures installation instructions for correct spray tip, pressure settings for spray system, finish preparation, spray calibration and spray procedure and technique.

3.04 TOLERANCES

A. Maximum Variation from Flat Plane: 1/8 inch in 10 feet, non-cumulative.

B. Maximum Offset from True Alignment or Position: 1/8 inch.

3.05 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 40 00 - Quality Requirements, will conduct field inspection and testing.

3.06 ADJUSTING

A. Remove sags or twists in ceiling system assembly.

B. Replace damaged or faulty components.

3.07 CLEANING

A. Clean system components after adjustment and balancing of system have been completed.

3.08 PROTECTION

A. Do not permit construction traffic through finished areas.

END OF SECTION

SECTION 09 64 66
WOOD ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing, delivering, erecting, and installing the following wood strip and plank flooring work:
   1. Wood athletic flooring.
   2. Floor finishes.
   3. Accessories for a complete installation.

B. Coordinate with Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete, to install fluid-applied flooring products in compliance with VRAIB warranty requirements.

1.02 ABBREVIATIONS AND ACRONYMS

A. CDPH. California Department of Public Health: www.cdph.ca.gov.

B. MFMA. Maple Flooring Manufacturers Association: www.maplefloor.org

C. NWFA. National Wood Flooring Association: www.nwfa.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

C. MFMA (SPEC) - Guide Specifications for Maple Flooring Systems.

D. NWFA (IG) - Installation Guidelines.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Shop Drawings: Indicate floor joint pattern and termination details.
   2. Samples: Submit two samples ___ by 12 inch in size showing floor finish, color, and sheen.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.
         2) Environmental Product Declarations (EPD).
         3) Health Product Declarations (HPD).
         4) CAL (CDPH SM) emissions testing compliance of ceilings.
         5) VOC content and CAL (CDPH SM) emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
   1. Maintenance Data: Include maintenance procedures and recommended maintenance materials.

2. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. See Section 01 60 00 - Product Requirements, for additional provisions.
    b. Extra Flooring Material: 10 square yards matching installed flooring.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and store off the floor in a well-ventilated, weather-tight space.

1.06 FIELD CONDITIONS

A. Do not install wood flooring until wet construction work is complete and permanent heat and air conditioning is installed and operating.

B. Maintain room temperature between 55 degrees F and 75 degrees F and relative humidity between 35 to 50 percent for a period of seven days prior to delivery of materials to installation space, during installation, and after installation.

C. Acclimate wood flooring materials to installation space a minimum of 48 hours prior to installation.

1.07 WARRANTY

A. Manufacturer / Special Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.

1. Product: Provide written material warranty for the finished wood flooring and associated work, agreeing to repair or replace flooring that shrinks, warps, cracks, or otherwise deteriorates excessively, or that buckles, delaminates, or fails to perform as indicated in the contract documented or as represented by the manufacturer, due to failures of materials and workmanship.
    a. Warranty Period:
        1) One year for stage wood flooring systems, beginning on date of Substantial Completion.
        2) Three years for other wood strip and plank flooring, beginning on date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Athletic Flooring:

1. Action Floor Systems: www.actionfloors.com.
2. Connor Sports Flooring; Neoshok: www.connorfloor.com. (Basis of Design)
3. Robbins Sports Surfaces; Bio-Cushion System: www.robbinsfloor.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 WOOD ATHLETIC FLOORING

A. General: Wood athletic flooring, system components provided by single manufacturer.

B. System Description:

1. Fixed, cushioned sleeper with subfloor system, wood strip flooring.

2.03 COMPONENTS

A. Wood Strip Flooring, Type WAF:

1. Species: Northern hard maple, kiln dried; tongue and groove edges, end matched.
2. Grade: First.
3. Thickness: 25/32 inch.
4. Width: 2-1/4 inches.
5. Depressed slab depth: 2-1/2 inches.

6. Length: Random, minimum of 9 inches.

2.04 FINISHES

A. Floor Finishes: Types recommended by flooring manufacturer and complying with MFMA specifications.
   1. Sealer: Oil based urethane.
   2. Finish Coats: Oil based urethane; high gloss.
   3. Custom color logo and school name lettering, location as indicated on drawings, to be determined by the Architect, colors to be selected from the finish manufacturers full range of standard and nonstandard colors.

2.05 ACCESSORIES

A. Ventilating Base: Molded rubber, 4 inch high with a ____ inch toe, pre-molded outside corners; black color.
B. Edge Strip: Angle; mill finish aluminum.
C. Transition Strip: Same species and finish as flooring material; profiles indicated.
D. Self-leveling underlayment as specified in Section 03 54 00 - Concrete Toppings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting this work.
B. Cementitious Sub-Floor Surfaces: Concrete slabs are treated with concrete vapor mitigation admixtures; testing of slabs for moisture and humidity is not required.
C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Prepare substrate to receive wood flooring in accordance with manufacturer's, MFMA (SPEC), and NWFA (IG) instructions, and as follows:
B. Vacuum clean substrate.

3.03 INSTALLATION

A. Wood Flooring:
   1. Install in accordance with manufacturer's and MFMA instructions.
   2. Lay flooring parallel to length of main playing area. Blind nail or staple to subfloor.
   3. Install edge strips at unprotected or exposed edges, and where flooring terminates.
   4. Provide 2 inch expansion space at walls and other interruptions.

3.04 CLEANING

A. Clean floor surfaces in accordance with floor finish manufacturer's instructions.

3.05 PROTECTION

A. Prohibit traffic on finished floor for 72 hours after installation.
B. Place protective coverings over finished floors; do not remove coverings until Date of Substantial Completion.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Resilient Flooring Trade Bid. See Section 09 00 05 - Resilient Flooring Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Furnishing, delivering, and installing the following resilient flooring work:
   1. Resilient sheet flooring.
   2. Resilient tile flooring.
   3. Static control resilient tile flooring.
   4. Resilient base.
   5. Resilient stair accessories.
   6. Accessories required for a complete installation.

B. Coordinate with Section 03 30 00 - Cast-in-Place Concrete and Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete, to install resilient flooring and adhesive products in compliance with warranty requirements.

1.03 ABBREVIATIONS AND ACRONYMS

A. APA. The Engineered Wood Association: www.apawood.org.

B. ASHRAE. American Society of Heating, Refrigerating and Air-Conditioning Engineers: www.ashrae.org.

C. ASTM. ASTM International; www.astm.org.

D. CDPH. California Department of Public Health: www.cdph.ca.gov.

E. FS. Federal Specifications: www.fedspecs.gsa.gov

F. NFPA. National Fire Protection Association; www.nfpa.org.

G. PS. Voluntary Product Standard, The Engineered Wood Association: www.apawood.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. APA Form L334 - Selection, Installation and Preparation of Plywood Underlayment.

C. ASHRAE Std 55 - Thermal Environmental Conditions for Human Occupancy.

D. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

E. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

F. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

G. FS RR-T-650 - Treads, Metallic and Nonmetallic, Skid Resistant.

H. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

I. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading.

J. ASTM F1859 - Standard Specification for Rubber Sheet Floor Covering Without Backing.

K. ASTM F1861 - Standard Specification for Resilient Wall Base.

L. ASTM F2034 - Standard Specification for Sheet Linoleum Floor Covering.

M. ASTM F2169 - Standard Specification for Resilient Stair Treads.

N. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
O. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
P. NFPA 258 - Recommended Practice for Determining Smoke Generation of Solid Materials.
Q. PS 1 - Structural Plywood.
R. PS 2 - Performance Standard for Wood Structural Panels.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination, and as follows:
   1. Preinstallation Meeting: Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this Section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.
   2. Sequencing and Scheduling per Section 01 32 16 - Construction Progress Schedule.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Submit manufacturer’s printed product literature for products specified, including product standards, identifying materials, components and systems, performance criteria, finishes, use limitations, preparation and installation recommendations, and initial maintenance protective coating and cleaning recommendations, and the following:
      a. Typical section details indicating each specified system on proposed substrates and transitions to other flooring systems.
      b. Typical sections indicating flooring system abutting walls.
   2. Shop Drawings: Submit drawings showing plans, illustrative seams, location and types of transition strips, fabrication and installation details, layout, patterns, colors, and the following:
      a. Requirements for expansion and contraction.
      b. Details and locations of each floor and wall termination condition.
   3. Selection Samples: Submit sample chains or architectural binder indicating manufacturer's complete range for each type of flooring material specified, to determine color, pattern, and/or composition for each type of material finish exposed to view.
   4. Verification Samples: Submit three representative samples of actual flooring material specified, not less than 12 by 12 inch in size, mounted on solid backing, illustrating color, pattern, and/or composition, for each resilient flooring product specified.
      a. When wood grain flooring is selected or specified, submit samples of visual wear layer demonstrating appearance of pattern; sample shall be not less than 4 square feet in size.
   5. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
   6. Installer's Qualification Statement.
   7. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Resilient Flooring Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Environmental Product Declarations (EPDs).
        3) Health Product Declarations (HPDs).
        4) CAL (CDPH SM) Emissions testing compliance of flooring.
        5) VOC content and CAL (CDPH SM) emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data: Including maintenance procedures, recommended maintenance materials, related product data and MSDS sheets, directions for product use and performance, and suggested schedule for cleaning, and stripping and re-waxing if applicable to flooring material.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. See Section 01 60 00 - Product Requirements, for additional provisions.
    b. Extra Flooring Material: Quantity equivalent to not less than 5 percent of each type, color, and pattern, in new, unopened packages.
    c. Extra Wall Base: Quantity equivalent to not less than 5 percent of each type, color, and pattern, in new, unopened packages.
    d. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color, .
4. Warranty Documentation Manufacturers' executed material warranties and installers' workmanship warranties completed in Owner's name and registered with manufacturer, for each type of resilient flooring system installed on project.
5. Demonstration and Training: Provide training to Owner's maintenance personnel on proper cleaning and maintenance techniques for resilient flooring. At Contractor's option, have flooring manufacturer's representative perform training. Contractor to coordinate.

1.07 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain materials through one source from a single manufacturer per flooring type.
1. Provide accessory materials, including patching and fill material, seam sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

B. Installer/Applicator Qualifications: Company specializing in installing specified flooring with minimum three years documented experience on installations of similar size and scope.

C. Field Samples per Section 01 40 00 - Quality Requirements: Provide field samples, dry laid, to demonstrate aesthetic effects of materials in situ, assisting the Architect and Owner in making final selections.
1. Minimum Layout Size: 25 square feet (2.3 square meters).

D. Regulatory Requirements:
1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
    a. Critical Radiant Flux Classification: Class I; not less than 0.45 W/cm2
    b. Smoke Density per ASTM E662 or NFPA 258: 450 or less

1.08 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. The project scope includes in-place mockup of each type of resilient flooring.

1. Schedule submittals for products indicated to be used in the mock-up to ensure sufficient time to allow review prior to the scheduled erection of the mock-up. Allow time for resubmittal and review.
2. Following acceptance of submittals for material components and selection of colors provide one mock-up of each resilient flooring type selected, in place for final review by Architect prior to proceeding with the work.
    a. The mock-up shall be constructed full-size, and utilize specified colors and materials.
    b. Demonstrate the anticipated range of materials, workmanship and finish expected.
    c. Accepted mock-ups will be used as standard of comparison for colors and textures, workmanship, and other pertinent details.
    d. The mock-up shall be observed, and all corrective actions required by the Architect or Owner shall be completed and mock-up accepted prior to commencing installation of resilient flooring. Modify and/or replace mock-ups as many times as are necessary to obtain Architect's and Owner's acceptance.

C. Locate where directed by Architect.

D. Mock-up may remain as part of work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Comply with manufacturer’s instructions and recommendations, Section 01 60 00 - Product Requirements, and as follows:

1. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
2. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
3. Store all materials off of the floor in an acclimatized, weather-tight space, in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.
4. Protect roll materials from damage by storing on end, unless otherwise directed by manufacturer.
5. Store base material unrolled and flat, unless otherwise indicated by manufacturer.

1.10 FIELD CONDITIONS

A. Conditions and Measurements: Visit jobsite to verify installation conditions and floor measurements.

B. Ambient Conditions per manufacturer’s written recommendations, Section 01 70 00 - Execution and Closeout Requirements, and as follows:

1. New concrete slabs shall be flat, clean and dry passing all flooring manufacturers’ moisture testing requirements.
    a. See Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete for information about slab water vapor emissivity properties.
2. Environmental Limitations: Do not deliver or install until building is enclosed, wet work is complete and HVAC system has been operating a minimum of two weeks, consistently maintaining temperature and RH at occupancy levels per ASHRAE Std 55 (Figure 5.2.1.1.), per manufacturer’s recommendations.

3. Acclimate product to installation location.
    a. Deliver materials to jobsite room in which it will be installed 48 hours before installation.
    b. Maintain Temperature: Minimum 65 degrees F, and maximum 80 degrees F for not less than 48 hours prior to and during installation and for not less than one week after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 55 degrees F or to go above 100 degrees F.
    c. Maintain Humidity: 25 to 60 percent RH prior to and during Installation.

1.11 WARRANTY

A. Manufacturer Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
    1. Resilient Sheet Flooring: Provide manufacturer’s limited commercial warranty stating resilient sheet flooring is guaranteed to be free from wear-through due to normal use in light industrial and commercial applications.
        a. Warranty Period: five years from date of Substantial Completion.
    2. Resilient Tile Flooring: Provide manufacturer’s limited commercial warranty stating resilient tile flooring is guaranteed to be free from wear-through due to normal use in light industrial and commercial applications.
        a. Warranty Period: five years from date of Substantial Completion.
    3. Resilient Base: Provide manufacturer's limited commercial warranty:
        a. Warranty Period: five years minimum, from date of Substantial Completion.
B. Adhesive Delamination Warranty: Provide manufacturer's warranty stating that there shall be no delamination failure:
    1. Due to adhesive failure for a period of three years from the date of Substantial Completion when applied to adhere flooring materials per Adhesive manufacturer's requirements.
    2. As long as substrate moisture vapor emissions and alkalinity comply with adhesive manufacturer's requirements.
    3. Adhesive shall be warrantied to a minimum of 99 percent Relative Humidity.

PART 2 PRODUCTS

2.01 SHEET FLOORING

A. Rubber Sheet Flooring - (RFL): 100 percent rubber composition, color and pattern through total thickness.
    1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
        a. Mannington Commercial: www.manningtoncommercial.com.
        b. Nora Systems, Inc.; Product: Norament Satura; www.nora.com. (Basis of Design)
        c. Roppe Corporation: www.roppe.com.
        d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
    2. Minimum Requirements: Comply with ASTM F1859, Type 1, without backing.
    3. VOC Content Limits: As specified in Section 01 81 13 - Sustainable Design Requirements.
    4. Total Thickness: 0.14 inch minimum.
    5. Seams: Heat welded.
        a. Rubber flooring and linoleum shall not be heat nor cold welded when they meet. Provide aluminum transition strip.
    6. Surface Texture: Hammered.
    7. Color and Pattern: To be selected by Architect from manufacturer's full line.

B. Linoleum Sheet Flooring - (LIN): Homogeneous wear layer bonded to backing, with color and pattern through wear layer thickness.
   1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. Forbo Flooring, Inc: www.forboflooringna.com.
      b. Gerflor USA, Inc: www.gerflorusa.com. (Basis of Design)
      c. Tarkett Flooring: www.tarkett.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Minimum Requirements: Comply with ASTM F2034, Type corresponding to type specified.
   3. VOC Content Limits: As specified in Section 01 81 13 - Sustainable Design Requirements.
   4. Backing: Jute fabric.
   5. Thickness: 0.100 inch, minimum, excluding backing.
   6. Seams: Bias cut, not heat welded.
      a. Rubber flooring and linoleum shall not be heat nor cold welded when they meet. Provide aluminum transition strip.
   7. Pattern: As indicated on Drawings.
   8. Color: As indicated on drawings.

C. Welding Rod: Solid bead in material compatible with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

2.02 TILE FLOORING

A. Compressed Quartz Tile - QTZ-1, QTZ-2:
   1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. Altro; Quartz Tile: www.altrofloors.com. (Basis of Design)
      b. Rikett; http://rikett.net.
      c. Procedo Flooring; www.procedoflooring.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Thickness: .08 inch.
   3. Tile Dimensions: 24 by 24 inches.
   4. Wear Layer: 2.0 mm, homogeneous construction.
   5. Composition: Compressed quartz and vinyl. Decorative vinyl chips and striations.
   6. Content: 70 percent quartz and 15 percent vinyl.
   7. Static Load Limit: 3000 psi, per ASTM F970.
   8. Fire and Smoke Performance: Class 1 per ASTM E648; less than 450 per ASTM E662.

B. Static Dissipative Tile - (SDT): Homogeneous; color and pattern throughout thickness.
   1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. Armstrong; Excelon SDT: www.armstrongflooring.com.
      b. Roppe Corporation: www.roppe.com.
      c. Tarkett; iQ Granit SD: www.commercial.tarkett.com.

d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2. VOC Content Limits: As specified in Section 01 81 13 - Sustainable Design Requirements.

2.03 STAIR COVERING (RST)

A. Stair Treads: Rubber; full width and depth of stair tread in one piece; tapered thickness.

1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   a. Nora Systems, Inc.: www.nora.com. (Basis of Design)
   b. Roppe Corporation; Rubber Stair Treads: www.roppe.com.
   c. Tarkett Flooring: www.tarkett.com.
   d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2. Minimum Requirements: Comply with FS RR-T-650 requirements corresponding to type specified.
3. Nominal Thickness: 0.1875 inch.
4. Nosing: Square.
5. Color: To be selected by Architect from manufacturer's full range.
6. Finish: Hammered.
7. Style: Smooth surface rubber striping, visually impaired strips, 2 inch by full width.

B. Stair Risers: Full height and width of tread in one piece, matching treads in material and color.

1. Thickness: 0.080 inch.

C. Stair Stringers: Full height in one piece and in maximum available lengths, matching treads in material and color.

1. Nominal Thickness: 0.080 inch.
2. Pattern: Solid color.

2.04 RESILIENT BASE (RB)

A. Resilient Base: ASTM F1861, Type TS, rubber, vulcanized thermoset; top set Style B, Cove.

1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   a. Mannington Commercial: www.manningtoncommercial.com.
   b. Nora Systems, Inc: www.nora.com. (Basis of Design)
   c. Roppe Corporation: www.roppe.com.
   d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2. Height: 4 inches.
3. Thickness: 0.125 inch.
4. Finish: Satin.
5. Length: Roll.
6. Color: As indicated on drawings.
7. Accessories: Premolded external corners, internal corners, and end stops.

2.05 ACCESSORIES

A. Adhesives: Solvent-free, low odor, acrylic based, pressure sensitive, water-resistant type as recommended by resilient sheet flooring manufacturer to suit resilient sheet flooring product and substrate conditions indicated.
   1. Moisture Limit: Adhesive shall be warrantied to 99 percent RH minimum (ASTM F2170).
   2. Surface pH Limit: Adhesive shall be warrantied within a pH range of 7.0 to 12.0 (ASTM F710).
   3. Adhesive Products: Subject to compliance with these specifications, provide products of one of the following:
      a. Basis of Design Product for use with RFL flooring type: Envirostix Adhesive System: www.mondousa.com.
      b. Basis of Design Product for use with RFT and RST flooring type: Nora Stepfix 240 Tape Adhesive: www.nora.com.
      c. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Primers: Solvent-free, low odor type as recommended by resilient flooring manufacturer for installation.

C. Seaming Materials: Type as recommended by resilient flooring manufacturer for installation.
   1. Color: As selected by Architect from flooring manufacturer’s complete range of standard and custom colors.

D. Moldings, Transition and Edge Strips: Shapes and profiles as indicated on the Drawings; Same manufacturer as base.

E. Copper Grounding Strips: Type and size as recommended by static control flooring manufacturer.

F. Cleaner: Neutral, as recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, Section 01 70 00 - Execution and Closeout Requirements, and as follows:
   1. Acceptance of Conditions: Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, surfaces, substrates, deflection, tolerances, levelness, plumbness, temperature, humidity, moisture content level, cleanliness and other conditions are per manufacturer's requirements, and ready to receive work.
         1) Verify that substrate is flat to within 1/8 inch in 10 feet (4.69mm in 3m) and within the equivalent of 1/32 inch in 12 inches (0.78mm per 0.3m) per ASTM F710.
         2) Where flatness and levelness tolerances deviate from manufacturer requirements, inform Construction Manager of unacceptable conditions. Do not install flooring until conditions are within acceptable tolerances. Commencing installation shall indicate the subcontractor’s acceptance of substrate conditions.

B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

C. 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.

D. Cementitious Sub-Floor Surfaces: Concrete slabs are treated with concrete vapor mitigation admixtures; testing of slabs for moisture and humidity is not required.

3.02 PREPARATION

A. Surface Preparation: Refer to manufacturer's instructions and recommendations, Section 01 40 00 - Quality Requirements, and Section 01 70 00 - Execution and Closeout Requirements, and as follows:
   1. Prepare substrates to ensure proper adhesion of the resilient flooring system.
   2. Concrete Substrates: Prepare according to ASTM F710.
      a. Verify the substrate is permanently dry, clean, smooth, and structurally sound.
         1) Substrate shall also be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, curing, sealing, hardening, or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that might prevent adhesive bond.
      b. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, silicone, or curing compounds using mechanical methods recommended by manufacturer.
         1) Use only non-chemical mechanical methods, such as bead blasting or abrasive cleaning, to completely remove bond breaker materials from the concrete surface.
         2) Removal procedures shall be completed a minimum 48 hours prior to starting concrete testing.
         3) Sweep and vacuum substrate just prior to installation.
      c. Install floor leveling toppings in accordance with Section 03 54 00 - Concrete Toppings: Base price shall include floor leveling toppings at all areas at concrete slabs to receive resilient flooring, to bring floor slabs into FF and FL tolerance and to meet manufacturer's recommended tolerances, including localized repair of surface defects identified by the flooring manufacturer as unacceptable for flooring installation. Provide a deduct unit price for areas at which field conditions do not require self-leveling underlayment to meet flooring manufacturer's requirements for flooring installation. See 00 43 22 - Unit Prices Form.
   3. Wood Substrates and Exterior Panel Type Underlayment. Prepare and install per PS 1, PS 2, and APA Form L334.
   4. Expansion joints, isolation joints or other moving joints in concrete shall not be filled with patching compound nor covered with resilient flooring.
   5. Sweep and vacuum clean flooring substrates immediately prior to installation of resilient sheet flooring
B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
C. Prohibit traffic until filler is fully cured.
D. Apply primer to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

A. General: Install Resilient Flooring and Accessories according to the Drawings, submittals, manufacturer's instructions, Section 01 70 00 - Execution and Closeout Requirements, and as follows:
   1. Starting installation constitutes acceptance of subfloor conditions.
   2. Install in accordance with manufacturer's written instructions.
   3. Adhesive-Applied Installation:
      a. Spread only enough adhesive to permit installation of materials before initial set.
      b. Fit joints and butt seams tightly.

c. Set flooring in place, press with heavy roller to attain full adhesion.

4. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
5. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
6. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - SHEET FLOORING

A. Lay out without adhesive, and reverse roll the resilient sheet flooring during acclimation period.
   1. Dry lay the sheet on the floor for 24 hours to ensure the sheet is totally relaxed.
   2. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
   3. Seal seams by heat welding where indicated.
   4. Lay flooring with tightly butted seams, unless recommended otherwise by the flooring manufacturer.
      a. Use seam sealer as recommended by the manufacturer for specific flooring type.

B. Cutting: Lay resilient sheet flooring starting at the marked centerline. Cut the sheet closely to the wall using a utility knife.
   1. Leave a 3/16 inch (5mm) gap at all inside and outside corners.
   2. Double cut sheet at seams.

C. Extend flooring into toe spaces, door reveals, closets, and similar openings.
   1. Extend resilient sheet flooring to center of door openings.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on sheet flooring as marked on substrates.
   1. Use chalk or other non-permanent, non-staining marking device.

E. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of adhesive and resilient sheet flooring.
   1. Do not saw-cut joints after installing resilient flooring.

F. Do not fill movement joints with patching compound or cover with resilient flooring.
   1. Install movement joint systems per manufacturers instructions.

G. Spray-Applied Adhesive Method:
   1. Do not place finish-flooring product until adhesive applied to substrate is ready to receive it per adhesive manufacturer’s instructions.
   2. Mark floor equivalent to manufacturer’s recommended area for size of container used. Apply no more or less adhesive than what manufacturer recommends.
   3. Outline perimeter of the room with a four to five inch (100mm to 125mm) wide band of adhesive. Apply the adhesive from eight-12 inches (200mm to 300mm) above the substrate.
   4. Lay flooring finish material, adjust and reset until layout placement is certain.
   5. Following installation of finish flooring (typically within an hour after installing) roll entire floor area with a 75 to 100 lb (34 to 45 kg) roller to ensure proper bonding with instant shear strength.
   6. Close space to traffic for two hours before beginning installation, however, flooring is immediately available after rolling for all range of use.

H. Trowel Adhesive Method: Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate with a trowel to produce a completed installation without open

cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.

1. Allow adhesive to set-up.
2. Roll the flooring within an hour after placing the flooring into the adhesive bed.
    a. Roll the seam area using a hand roller.
    b. Roll the floor in both directions, with a 100 lb three-section roller overlapping the previous rolled area by 1/2 of the width of the roller.
3. Protect flooring from foot traffic for 12 hours before and after installation per adhesive manufacturer's instructions to allow proper set up time.
    a. Keep furniture, fixtures, and rolling traffic off the floor for 48 hours.

3.05 INSTALLATION - TILE FLOORING

A. Apply and install all materials in strict accordance with printed instructions of the material manufacturer.

B. Butt tightly to vertical surfaces, thresholds, nosing and edgings. Scribe around obstructions to produce neat joints, laid tight, even and straight. Extend flooring into toe spaces, door reveals, and into closets and similar openings.

C. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring as furnished by others. Refer to other specification sections for expansion joint covers.

D. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.
    1. Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.

E. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

F. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

G. Install square tile to ashlar pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

3.06 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.07 INSTALLATION - STAIR COVERINGS

A. Install stair coverings in one piece for full width and depth of tread.

B. Install stringers configured tightly to stair profile.

C. Adhere over entire surface. Fit accurately and securely.

3.08 FIELD QUALITY CONTROL

A. Site Tests and Inspections per Section 01 40 00 - Quality Requirements, and as follows:
    1. Inspect floor installation for non-conforming work including, but not limited to, the following:
        a. Improper substrate preparation as indicated by: Buckling or telegraphing; air blisters, buckles, and dirt or debris under the sheet flooring; and Moisture related failures.

b. Lack of adequate adhesion as exhibited by: Loose edges or seams; seams peaking; shrinkage, or wide or too tight joints; or adhesive oozing or adhesive on top of the flooring
c. Damaged flooring as indicated by indentations, splits, cuts, cracks, punctures, melting, or burn marks

B. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
1. Touch-up damaged surface finishes.
2. Replace damaged materials or items with new if repair not acceptable to Architect.

3.09 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Remove excess adhesive from floor, base, and wall surfaces without damage, using products and methods recommended by flooring and adhesive manufacturers for applicable flooring types and adjacent materials.

3.10 PROTECTION

A. Protect finished resilient flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion or Owner occupancy, whichever occurs first.
B. Prohibit traffic on resilient flooring for 48 hours after installation, or for time period indicated by manufacturer, whichever is longer.

END OF SECTION

SECTION 09 65 66
RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing, delivering, and installing the following resilient athletic flooring work:
   1. Preformed athletic flooring:
      a. Rubber sheet flooring.
   2. Ventilating wall base.
   3. Accessories required for a complete installation.

B. Coordinate with Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete, to install resilient athletic flooring and adhesive products in compliance with warranty requirements.

1.02 PRICE AND PAYMENT PROCEDURES

A. Refer to Section 01 20 00 - Price and Payment Procedures.

B. Unit Prices:
   1. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

1.03 ABBREVIATIONS AND ACRONYMS

A. ASHRAE. American Society of Heating, Refrigerating, and Air-Conditioning Engineers; www.ashrae.org.

B. ASTM. ASTM International; www.astm.org.

C. CDPH. California Department of Public Health; www.cdph.ca.gov.

D. NFPA. National Fire Protection Association; www.nfpa.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASHRAE Std 55 - Thermal Environmental Conditions for Human Occupancy.

C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

D. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

E. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness.

F. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

G. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

H. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

I. ASTM F2772 - Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems.

J. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

K. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

L. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

M. NFPA 258 - Recommended Practice for Determining Smoke Generation of Solid Materials.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Per Section 01 31 14 - Coordination, and as follows:
   1. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.
   2. Sequencing and Scheduling: Per Section 01 32 16 - Construction Progress Schedule.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Product Data: Submit Manufacturer's printed product literature for products specified, including product standards, identifying materials, components and systems, performance criteria, finishes, use limitations, preparation and installation recommendations, and initial protective coating and cleaning recommendations.
      a. Submit sports performance properties of flooring documenting compliance with ASTM F2772.
      b. Typical section details indicating each specified system on proposed substrates and transitions to other flooring systems.
      c. Typical sections indicating flooring system abutting walls.
   2. Shop Drawings: Submit drawings showing plans, illustrative seams, location and types of transition strips, fabrication and installation details, layout, patterns, colors, and the following:
      a. Locations, widths, design, and colors of game line markings, and equipment locations.
      b. Requirements for expansion and contraction.
      c. Details and locations of each floor and wall termination condition.
   3. Selection Samples: Submit sample chains or architectural binder indicating manufacturer's complete range for each type of flooring material specified and game line paints, to determine color, pattern, and composition for each type of material finish exposed to view.
   4. Verification Samples: Submit three representative sample of actual flooring material specified, not less than 12 inch square, mounted on solid backing.
      a. When wood grain flooring is selected or specified, submit samples of visual wear layer demonstrating appearance of pattern; sample shall be not less than 4 square feet in size.
   5. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports, and adhesive compatibility and adhesion test report.
   6. Installer's qualification statement.
   7. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.
         2) Environmental Product Declarations (EPD).

3) Health Product Declarations (HPD).
4) CAL (CDPH SM) Emissions testing compliance of flooring.
5) VOC content and CAL (CDPH SM) emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranty Documentation: Manufacturers' executed material warranties and installers' workmanship warranties completed in Owner's name and registered with manufacturer, for each type of resilient athletic flooring system installed on project.
3. Operation and Maintenance Data: Including maintenance procedures, recommended maintenance materials, related product data and MSDS sheets, directions for product use and performance, and suggested schedule for cleaning.
4. Additional Materials: Provide to the following to the Owner prior to project closeout:
a. Extra Flooring Material: Additional resilient athletic flooring material amounting to five percent of each type, color, and pattern, in new, unopened packages.
5. Demonstration and Training: Provide training to Owner's maintenance personnel on proper cleaning and maintenance techniques for resilient athletic flooring. At Contractor's option, have flooring manufacturer's representative perform training. Contractor to coordinate.

1.07 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain materials through one source from a single manufacturer per flooring type.
1. Provide accessory materials, including patching and fill material, seam sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
B. Installer Qualifications: Company specializing in installing specified flooring with minimum five years of documented experience in installations of similar size and scope.
C. Regulatory Requirements
1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
a. Critical Radiant Flux Classification: Class I; not less than 0.45 W/cm².
b. Smoke Density per ASTM E662 or NFPA 258: 450 or less.
D. Sustainability Standards and Certifications: See Sustainability Submittals paragraph in PART 1 and Section 01 81 13 - Sustainable Design Requirements.
E. Athletic Performance Properties: Materials shall comply with ASTM F2772 requirements for Class 3 performance in force reduction and ball rebound.

1.08 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. The project scope includes in-place mockup of each type of resilient athletic flooring.
1. Schedule submittals for products indicated to be used in the mock-up to ensure sufficient time to allow review prior to the scheduled erection of the mock-up. Allow time for resubmittal and review.
2. Following acceptance of submittals for material components and selection of colors provide one mock-up of each resilient flooring type selected, in place for final review by Architect prior to proceeding with the work.
a. The mock-up shall be constructed full-size, and utilize specified colors and materials.
b. Demonstrate the anticipated range of materials, workmanship and finish expected.

c. Accepted mock-ups will be used as standard of comparison for colors and textures, workmanship, and other pertinent details.
d. The mock-up shall be observed, and all corrective actions required by the Architect or Owner shall be completed and mock-up accepted prior to commencing installation of resilient athletic flooring. Modify and/or replace mock-ups as many times as are necessary to obtain Architect's and Owner's acceptance.

C. Locate where directed.
D. Mock-up may remain as part of work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
B. Comply with manufacturer’s instructions and recommendations, Section 01 60 00 - Product Requirements, and as follows:
1. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
2. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
3. Store materials off of the floor in an acclimatized, weather-tight space, in a dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.
4. Protect roll materials from damage by storing on end, unless otherwise indicated by manufacturer.
5. Store base material unrolled and flat, unless otherwise indicated by manufacturer.

1.10 FIELD CONDITIONS

A. Conditions and Measurements: Visit jobsite to verify installation conditions and floor measurements.
B. Ambient Conditions per manufacturer’s written recommendations, Section 01 70 00 - Execution and Closeout Requirements, and as follows:
1. New concrete slabs shall be flat, clean and dry passing all flooring manufacturers’ moisture testing requirements.
a. Refer to Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete for information about slab water vapor emissivity properties.
2. Environmental Limitations: Do not deliver or install until building is enclosed, wet work is complete and HVAC system has been operating a minimum of two weeks, consistently maintaining temperature and RH at occupancy levels per ASHRAE Std 55 (Figure 5.2.1.1.), per manufacturer’s recommendations.
a. Maintain temperature and humidity at occupancy levels.
3. Acclimate product to installation location.
a. Deliver materials to jobsite room in which it will be installed 48 hours before installation.
b. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70 to 95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.
c. Maintain Humidity: 25 to 60 percent RH prior to and during Installation.

1.11 WARRANTY

A. Manufacturer Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
   1. Resilient Athletic Sheet Flooring: Provide manufacturer's limited warranty stating athletic sheet flooring is guaranteed to be free from wear-through due to normal athletic use.
      a. Warranty Period:
         1) Surface wear-through: Minimum eight years.
         2) Other flooring material and workmanship failures: two years.
   2. Adhesive Delamination Warranty: Provide manufacturer's warranty stating that there shall be no delamination failure:
      a. Due to adhesive failure for a period of three years from the date of Substantial Completion when applied to adhere flooring materials per Adhesive manufacturer's requirements.
      b. As long as substrate moisture vapor emissions and alkalinity comply with adhesive manufacturer's requirements.

PART 2 PRODUCTS

2.01 PREFORMED ATHLETIC FLOORING

A. Manufacturers: All products by the same manufacturer. Subject to compliance with these specifications, provide products of one of the following:
   1. Ecore; OSST SPORTS - Compact Marble; www.ecoreathletic.com. (Basis of Design)
   2. Mondo America, Inc; Sport Impact: www.mondoworldwide.com.
      a. Lot shall have been produced after April, 2022.
   3. Robbins Sports Surfaces; Galaxy Fit Floor System: www.robbinsfloor.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Rubber Sheet Flooring, Type 1 (RAF1): Rubber roll goods comprising rubber granules encapsulated in a zero-mercury polyurethane binder, lengths to avoid transverse seams.
   1. VOC Content: As specified in Section 01 81 13 - Sustainable Design Requirements.
   2. Fungal Resistance per ASTM G21: No growth
   3. Dry Slip Resistance per ASTM D2047: 0.50 to 1.20
   4. Thickness: Minimum 1/4 inch.
   5. Sheet Width: Minimum 48 inches.
   6. Tensile Strength: Minimum 150 psi, per ASTM D412.
   7. Durometer Hardness, Type A: Minimum of 55, when tested in accordance with ASTM D2240.
   8. Color: To be selected by Architect will select from manufacturer's full line of standard and custom colors.

2.02 ACCESSORIES

A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.

B. Primers, Adhesives, and Seaming Materials: Solvent-free, low odor, acrylic based, pressure sensitive, water-resistant type acceptable to flooring manufacturer.
   1. Manufacturers: Mondo; PU 440, or equal.
   2. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, Section 01 70 00 - Execution and Closeout Requirements, and as follows:
   1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, surfaces, substrates, deflection, temperature, humidity, moisture content level, cleanliness and other conditions are per manufacturer's requirements, and ready to receive work.
         1) Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, and in compliance with ASTM F710, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
            (a) Where flatness and levelness tolerances deviate from manufacturer requirements, provide floor leveling toppings to bring substrate within manufacturer tolerances. Proceed with installation only after unsatisfactory conditions have been corrected.
   2. Cementitious Sub-Floor Surfaces: Concrete slabs are treated with concrete vapor mitigation admixtures; testing of slabs for moisture and humidity is not required.

3.02 PREPARATION

A. Refer to manufacturer's instructions and recommendations, Section 01 40 00 - Quality Requirements, and Section 01 70 00 - Execution and Closeout Requirements, and as follows:
   1. Starting installation constitutes acceptance of sub-floor conditions.
   2. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
   3. Concrete: Use non-gypsum type leveling compound, per Section 03 54 00 - Concrete Toppings.
      a. Base price shall include floor leveling toppings at all areas at concrete slabs to receive resilient athletic flooring, to bring floor slabs into FF and FL tolerance and meet manufacturer's recommended tolerances, including localized repair of surface defects identified by the flooring manufacturer as unacceptable for flooring installation. Provide a deduct unit price for areas at which field conditions do not require self-leveling underlayment to meet flooring manufacturer's requirements for flooring installation.
   4. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
   5. Expansion joints, isolation joints or other moving joints in concrete shall not be filled with patching compound or covered with resilient athletic flooring.
   6. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

A. Refer to Sections 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements, and the following:
   1. Starting installation constitutes acceptance of subfloor conditions.
   2. Install in accordance with manufacturer's written instructions and approved shop drawings.
   3. Resilient Sheet Flooring:
      a. Unroll flooring and allow to relax before beginning installation.

b. Mix adhesive thoroughly and apply to substrate with notched trowel. Roll flooring into fresh adhesive, overlapping end seams and double cutting, butting factory edges and compression fitting.
c. Roll entire flooring surface with steel roller to assure adhesion to substrate and eliminate air bubbles.
d. Immediately remove any adhesive from flooring surface, using chemical recommended by flooring manufacturer.
e. Weld seams using techniques and equipment recommended by manufacturer.
f. Apply transparent top coat over flooring if recommended by manufacturer, to achieve a uniform finished appearance.
g. When not indicated in Drawings as part of base bid scope and when requested by Owner, cooperate and coordinate with Owner's specialty contractor to accommodate special painted graphics on the floor, such as words or logos prior to applying top coat. Advise Owner or Owner's contractor as to which paint products are acceptable for use on floor, complying with flooring manufacturer's recommendations.
    1) Products used in special painted graphics shall meet VOC limits stated in Section 01 81 13 - Sustainable Design Requirements.

3.04 FIELD QUALITY CONTROL

A. Site Tests and Inspections per 01 40 00 - Quality Requirements, and as follows:
B. Inspect floor installation for non-conforming work including, but not limited to, the following:
    1. Improper substrate preparation as indicated by: buckling or telegraphing; air blisters, buckles, and dirt or debris under the sheet flooring; and Moisture related failures.
    2. Lack of adequate adhesion as exhibited by: Loose edges or seams; seams peaking; shrinkage, or wide or too tight joints; or adhesive oozing or adhesive on top of the flooring.
    3. Damaged flooring as indicated by indentations, splits, cuts, cracks, punctures, melting, or burn marks.
C. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
    1. Touch-up damaged surface finishes.
    2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Remove excess adhesive from floor, base, and wall surfaces without damage.
C. Clean flooring using methods recommended by manufacturer.

3.06 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation, or for time period indicated by manufacturer, whichever is longer.
B. Protect finished resilient athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion or Owner occupancy, whichever occurs first. Minimize foot traffic on flooring following installation.

END OF SECTION

SECTION 09 66 23
THIN SET EPOXY TERRAZZO FLOORING

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this Section shall be included in the Terrazzo Trade Bid. Refer to Section 09 00 06 - Terrazzo Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Furnishing, delivering, and installing the following work:
   1. Thin-set epoxy terrazzo flooring including preparation of substrates.
   2. Divider strips.
   3. Thin-set precast epoxy terrazzo wall base units.
   4. Precast epoxy terrazzo stair tread units.
   5. Related accessories for a complete installation.

B. Coordinate with Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete, to install fluid-applied flooring products in compliance with warranty requirements.

1.03 PRICE AND PAYMENT PROCEDURES

A. Refer to Section 01 20 00-Price and Payment Procedures.

B. Alternates: See Section 01 23 00-Alternates, for product alternatives affecting this Section.

1.04 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.

B. CAL (CDPH). California Department of Public Health: cdph.ca.gov.

C. CFR. Code of Federal Regulations: www.govinfo.gov.

D. EPA. United States Environmental Protection Agency: www.epa.gov.

E. ICRI. International Concrete Repair Institute: www.icri.org.

F. NTMA. National Terrazzo & Mosaic Association: https://ntma.com/.

G. SCAQMD. South Coast Air Quality Management District: www.aqmd.gov.

1.05 REFERENCE STANDARDS

A. Editions of listed standards as reference by applicable codes, or most current edition if not referenced:

B. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

C. ASTM C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

E. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

F. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.

G. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and +30°C with a Vitreous Silica Dilatometer.

H. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

I. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems.

J. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

K. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness.
L. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
M. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
N. EPA Method 24 - Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings.
O. ICRI 03732 - Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
P. NTMA (GRAD) - Aggregate Gradation Standards.
Q. NTMA (SPECS) - NTMA Terrazzo Specifications.
R. SCAQMD 1168 - Adhesive and Sealant Applications.
S. NTMA (EPOXY) - Epoxy Terrazzo Specifications.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination.
B. Preinstallation meeting required per Section 01 70 00 - Execution and Closeout Requirements.
    1. Inspect and discuss installation procedures, joint details, job site conditions, substrate specification, vapor barrier details and coordination with other trades.
    2. Review and finalize construction schedule and verify availability of materials, installer’s personnel, equipment and facilities needed to make progress and avoid delays.
    3. Review special terrazzo designs and patterns.
    4. Review plans for concrete curing and site drying to enable timely achievement of suitable slab moisture conditions.
C. Sequencing and scheduling per Section 01 32 16 - Construction Progress Schedule.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
    1. Manufacturer’s product data for each type of terrazzo and accessory. System will be evaluated on the basis of standards. For tests not listed in published data, manufacturer shall supply missing data according to standard referenced.
        a. Physical properties.
        b. Performance properties.
        c. Specified tests.
        d. Material Safety Data Sheet.
    2. Shop Drawings. Include terrazzo installation requirements. Include plans, elevations, sections, component details and attachments to other work. Show layout of the following:
        a. Divider strips.
        b. Control and expansion joint strips.
        c. Base and border strips.
        d. Abrasive strips.
        e. Stair treads, risers and landings.
        f. Pre-cast terrazzo jointing and edge configurations including anchorage details.
        g. Terrazzo patterns.
        h. Decorative inserts.
    3. Samples for initial selection from manufacturers color plates showing the full range of colors and patterns available for each terrazzo type indicated.

4. Samples for Verification: Match architect's samples for each type, material, color and pattern of terrazzo and accessory required showing the full range of color, texture and pattern variations expected. Label each terrazzo sample to identify matrix color and aggregate types, sizes and proportions. Prepare samples of same thickness and from same material to be used for the work in size indicated below:
    a. Epoxy terrazzo: minimum 6 by 6 inch sample of each color and type of terrazzo.
    b. Precast epoxy terrazzo: minimum 6 by 6 inch sample of each color and type of terrazzo.
    c. Accessories: 6 inch length of each kind of divider strip, stop strip and control joint strip required.
    d. Stair Treads: 12 inch length sample combination tread/riser with cast-in nosing.
5. Material Test Reports: For moisture and relative humidity of substrate.
6. Installer's Qualification Statement.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Terrazzo Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.The
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Environmental Product Declarations (EPD).
        3) Health Product Declarations (HPD)
        4) CAL (CDPH SM) Emissions testing compliance of flooring.
        5) Low-Emitting Materials: Document that materials do not exceed VOC limits of either the CAL (CDPH SM) including 2004 addenda, or adhesives, sealants, and sealant primers must comply with SCAQMD 1168 and rule amendment date of January 7, 2005. Refer to Section 01 81 13 - Sustainable Design Requirements.
            (a) Adhesives and Sealants: Products used within the building waterproofing barrier layer.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Submit three copies of NTMA maintenance recommendations and three copies of manufacturer's maintenance instructions
3. Extra materials:
    a. Provide 25 linear feet of cast wall base (each profile.)
    b. Provide equivalent of 50 square feet of each cast in place color mix.
    c. Provide 50 linear feet of each type of divider and transition strip.

1.08 QUALITY ASSURANCE

A. Perform work in accordance with NTMA recommendations as posted at their web site at www.ntma.com.

B. Installer Qualifications: Company specializing in performing the type of work specified in this Section.

1. 10-year history of contractor membership in the National Terrazzo and Mosaic Association, Inc. (NTMA).
2. Minimum of five epoxy terrazzo projects using material being submitted for this project installed during the last five years, of the same scope, complexity and at least 50 percent of the square footage.

C. Source Limitations:
1. Obtain primary Epoxy Terrazzo Flooring System materials including moisture treatment, membranes, primers, resins and hardening agents from a single manufacturer with proof of NTMA membership.
2. Obtain aggregates, divider strips, sealers and cleaners from source recommended by primary materials manufacturer.

1.09 MOCK-UP

A. Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mock-ups for terrazzo including accessories.
a. Size: Approximately 200 square feet of typical poured-in-place flooring and base condition, comprised of all scheduled color mixes, and examples of typical control joint.

B. Locate mock-ups where directed by Architect.

C. Accepted mock-up may remain as part of the work if undisturbed at Substantial Completion.
1. Unacceptable Mockups shall be removed by the Terrazzo Trade Contractor.

D. Refer to Section 01 40 00 - Quality Requirements for additional mock-up requirements.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in supplier’s original wrappings and containers labeled with source’s or manufacturer’s name, material or product brand name and lot number if any.

B. Store terrazzo materials in their original, undamaged packages and containers inside a dry, secure, well-ventilated area protected from weather, moisture, soiling, extreme temperatures and humidity.

C. Maintain temperatures between 50 degrees F to 80 degrees F

D. Keep products away from fire or open flame.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these Specifications, provide products of one of the following:
1. Crossfield Products Corp., Dex-o-Tex Division; Dex-O-Tex Cheminert Epoxy Terrazzo: dex-o-tex.com/products/terrazzo.
2. Key Resin Company; Key Epoxy Terrazzo System Epoxy: https://www.keyresin.com/products/floor-wall-coatings/.
3. Sherwin Williams, High Performance Floors, Resuflor Terrazzo TG: https://industrial.sherwin-williams.com/na/us/en/resin-flooring.html.
4. Terrazzo & Marble Supply Companies; Terroxy Resin Systems Epoxy Matrix: www.tmsupply.com. (Basis of Design)
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 MATERIALS

A. Primer: type recommended by manufacturer's written instructions.

B. Moisture Vapor Treatment: Moisture Vapor Treatment (MVT).
1. Contractor to include MVT for all slabs on-grade, light weight concrete and green concrete.

2. Physical properties of moisture mitigating primer shall have a maximum of 0.3 perms with 100 percent RH.

C. Flexible Reinforcing Membrane: Manufacturer's recommended crack isolation membrane, for substrate crack preparation and reflective crack reduction.
   1. Reinforcement: Fiberglass scrim.

D. Epoxy Matrix:
   1. Physical properties without aggregates. All specimens cured for 7 days at 73-77 degrees F and 50 percent plus or minus 2 percent RH. Product shall meet the following requirements:
      a. Hardness: ASTM D2240 using Shore-D Durometer: 75-85.
      b. Tensile Strength: ASTM D638 : 4800 psi minimum. ASTM D638
      c. Compressive Strength: ASTM D695 Specimen B Cylinder: 12,000 psi minimum, 31.7 MPa.
      d. Flexural Strength: ASTM D790: 4500 psi minimum, 31.7 MPa.
      e. Chemical Resistance: ASTM D1308 seven days at room temperature by immersion method: no deleterious effects: distilled water, mineral oil, isopropanol, ethanol, 0.025 detergent solution, 1 percent soap solution, 10 percent sodium hydroxide, 10 percent hydrochloric acid, 30 percent sulfuric acid, 5 percent acetic acid.
   2. Physical properties with aggregates. For Epoxy Matrix blended with three volumes of Valders marble blended 60 percent #1 chip and 40 percent #0 chip, ground and grouted with epoxy resin according to Installation Specifications, finishing to a nominal 3/8 inch thickness. All specimens cured for 7 days at 73-77 degrees F and 50 percent RH plus or minus 2 percent RH. This finished Epoxy Matrix shall meet the following requirements:
      a. Flammability: ASTM D635: Self-extinguishing, extent of burning 0.25 inches max.
      b. Thermal Coefficient of Linear Expansion: ASTM D696: 25x10-6 inches per inch per degrees to 140 degrees F, 11.4 x 10-7 cm per cm per ºC to 60ºC Max.
      c. Bond Strength: ACI Committee No. 403 Bulletin Title No. 59-43 (pages 1139-1141): 300 psi (100 percent concrete failure), 2.1 MPa (100 percent concrete failure).
      d. Critical Radiant Flux: ASTM E648: 1.0 watts/cm2.
   3. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
   4. 24-Hour Absorption Rate: Less than 0.74 percent.
   5. Dust Content: Less than 1.0 percent by weight.

E. Aggregate: Marble; complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.
   1. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C131.
   2. 24-Hour Absorption Rate: Less than 0.74 percent.
   3. Dust Content: Less than 1.0 percent by weight.

F. Finishing Grout: Epoxy Matrix or Clear Resin with a broadcast of limestone filler as recommended by manufacturer.

2.03 MIX

A. Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.
   1. Color and pattern schedule: Where the following designations are indicated, provide specified terrazzo matrices matching architect's samples:
      a. TERR-1.
      b. TERR-2.
      c. TERR-3.
      d. TERR-5.

e. TERR-6.

2.04 STRIP MATERIALS

A. Thin-set Divider Strips: L-type.
   1. Material: Aluminum.
   2. Depth: 3/8 inch.
   3. Top width: 1/16 inch for joint details.

B. Control/Construction Joints (saw cut, cold joint): Detail joints in accordance with NTMA Tech Bulletin T-24 and in coordination with concrete slab joints below.
   1. Option 1. Preferred: Separate double L-type angles back to back with minimum 1/8 inch width between. Fill joint and area between strips with semi-flexible joint filler.
   2. Option 2. Fill saw cut with 100 percent solids epoxy. Place single L-type angle strip shouldered on concrete, adjacent to the joint.

C. Expansion Joint Strips: Separate double L-type angles, positioned back to back with minimum 1/8 inch width between. Fill area between strips with semi-flexible joint filler.

D. Random Crack Detail: For cracks over 1/16 inch width before surface preparation.
   1. Fill saw cut with 100 percent solids epoxy, followed by application of crack isolation membrane (40 mils / 1.0mm) with fiberglass mesh reinforcement embedded into the membrane.

E. For epoxy terrazzo exposed to direct sunlight use strip method B Option 1 (referenced above) every 8 to 12 feet in each direction to compensate for thermal expansion/contraction.

2.05 MISCELLANEOUS ACCESSORIES

A. Strip Adhesive: 100 percent solids epoxy resin adhesive recommended by manufacturer.
   1. Use adhesive that has a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), or complying with project's sustainability requirements per Section 01 81 13 - Sustainable Design Requirements, whichever is more stringent.

B. Anchoring Devices:
   1. Strips: Provide mechanical anchoring devices for strip materials as required for secure attachment to substrate.
   2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by terrazzo contractor for proper anchorage and support of units for conditions of installation and support.

C. Patching and Fill Material: epoxy and sand fill as recommended by manufacturer, meeting minimum compressive strength and maximum aggregate to resin ratio 4:1.

D. Joint Compound: Joint Filler, color to be selected by Architect to match/compliment terrazzo.

E. Cleaner: Manufacturer's recommended neutral cleaner with pH factor between 7 and 10 specifically designed for terrazzo.

F. Surface Finish System: All terrazzo shall be finished to a minimum 200 Grit finish, with the exception of black terrazzo, which will be finished up to a 400 grit finish.

G. Sealer: Manufacturer's recommended slip- and stain-resistant sealer that is chemically neutral with a pH factor between 7 and 10, that meets a standard coefficient of friction of 0.6 or higher, as measured by the James Machine (ASTM D2047 Test Method), does not affect physical properties of terrazzo and complies with NTMA’s “Terrazzo Specifications and Design Guide.”

H. Non-Slip Inserts: Provide channel-shaped inserts filled with a mixture of resin and fine, abrasive aggregate.
   1. Provide three lines of inserts at stair nosings.
   2. Provide one line of inserts at ramps, positioned six inches apart across the ramp perpendicular to traffic.

3. Width:
    a. 1/2 inch at stairs.
    b. 3/8 inch at ramps.
4. Length:
    a. 4 inches less than stair width.
    b. 8 inches less than ramp width.
5. Color: Black.

2.06 PRECAST TERRAZZO

A. Precast Terrazzo Base Units: Precast epoxy terrazzo base units, from same manufacturer as thinset epoxy terrazzo flooring.
    1. Profiles as indicated on drawings.
    2. Color and pattern: color mix as indicated on drawings.
B. Precast Terrazzo Stair Treads: Thickness indicated with cast-in nosing.
    1. Tread: set in 1/4 inch epoxy bed; with 1/2 inch black abrasives.
    2. Color and Pattern: Match Architect's accepted sample, as scheduled on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and areas, with Terrazzo Trade Contractor present, for compliance with requirements for installation tolerances and other conditions affecting performance. Notify Construction Manager of unsuitable conditions. Proceed with installation only after unsatisfactory conditions, including level tolerances, have been corrected. Commencement of work constitutes acceptance of conditions.
B. Evaluate slab condition, including slab moisture content and extent of repairs required, if any.
C. Acceptable Substrates:
    1. Provide sound concrete surface free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil and other contaminants incompatible with terrazzo.
    2. Level tolerance: Concrete sub-floor shall be level with a maximum variation from level of 1/4 inch in 10 feet . Any irregularity of the surface requiring patching and/or leveling shall be done using epoxy and sand fill as recommended by manufacturer.
    3. Concrete floor shall be prepared mechanically by shot blasting in accordance with ICRI 03732. Specifically, surface preparation results should achieve a CSP3-CSP5 profile.
    4. Damaged and deteriorated concrete shall be repaired and leveled according to manufacturer's instructions for thin-set epoxy terrazzo.
    5. Cracks and non-expansion joints greater than 1/16 inch wide shall be repaired according to NTMA Tech Bulletin T-24.
    6. Concrete floor shall receive a steel trowel finish.
    7. Concrete shall be cured a minimum of 28 days. No curing agents are to be used in areas to receive terrazzo.
    8. Concrete slab on grade shall have an efficient moisture vapor barrier per Section 03 30 00 directly under the concrete slab. Moisture barrier shall NOT be punctured.
    9. Saw cutting of control joints must be done per American Concrete Institute (ACI) recommendations and per Section 03 30 00.
D. Cementitious Sub-Floor Surfaces: Concrete slabs are treated with concrete vapor mitigation admixtures; testing of slabs for moisture and humidity is not required.

3.02 PREPARATION

A. Maintain the ambient room and floor temperature at 60 degrees F or above for a period extending 72 hours before, during and after floor installation. Concrete to receive epoxy terrazzo shall have cured for at least 28 days and be free of all curing compounds.

B. Clean substrates of substances, including oil, grease and curing compounds, that might impair terrazzo bond. Provide clean, dry and neutral substrate for terrazzo application.

C. Prior to and during each day of installation, the terrazzo contractor shall verify that the dew point is at least 5 degrees F less than the slab and air temperature.

D. Clean substrate of foreign matter.

E. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.

1. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

3.03 INSTALLATION

A. General:

1. Apply to terrazzo substrates in accordance with manufacturer's written instructions, and in compliance with NTMA (SPECS) “Terrazzo Specifications and Design Guide” and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.
2. Place, rough grind, grout, cure grout, fine grind and finish terrazzo according to manufacturer’s instructions and NTMA’s “Terrazzo Specifications and Design Guide.”
3. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
4. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
5. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

B. Thickness: 3/8 inch.

C. Flexible Reinforcing Membrane

1. Membrane application for isolated cracking. Route out all cracks and fill with 100 percent solids epoxy. Apply Iso-Crack Epoxy Membrane (spread at 40 mils = 1.0 mm thickness) across the crack allowing 12 inches on either side. Imbed fiberglass scrim at a minimum of 9 inches into wet membrane and saturate with additional membrane.

D. Primer: Apply to terrazzo substrates according to manufacturer’s instructions.

E. Strip Materials:

1. Divider and Accessory Strips:
    a. Install strips according to pattern approved on shop drawings.
    b. Detail joints in accordance with NTMA Tech Bulletin T-24.
    c. Install strips in adhesive setting bed without voids below strips or mechanically anchor strips as required to attach strips to substrate.
        1) Control/Construction Joints (saw cut, cold joint):
            (a) Option 1- Preferred: Separate double L-type angles back to back with minimum 1/8 inch width between. Fill joint and area between strips with semi-flexible joint filler.
            (b) Option 2. Fill saw cut with 100 perce solids epoxy. Place single L-type angle strip shouldered on concrete, adjacent to the joint.

2) Expansion Joint Strips: Separate double L-type angles, positioned back to back with minimum 1/8 inch width between. Fill area between strips with semi-flexible joint filler.
3) Random Crack Detail: For cracks over 1/16 inch width before surface preparation. Fill saw cut with 100 percent solids epoxy, followed by application of crack isolation membrane with fiberglass mesh reinforcement embedded into the membrane.
   (a) Contractor shall include 10 percent additional lineal feet for random crack repair.
4) For epoxy terrazzo exposed to direct sunlight use strip method B Option 1. (referenced above) every 8 to 12 feet in each direction to compensate for thermal expansion/contraction.

F. Placing Terrazzo:
   1. Mix epoxy matrix with chips and fillers in ratios directed by manufacturer.
   2. Trowel apply terrazzo mixture over epoxy primer to provide a dense flat surface to top of divider strips. Allow to cure per manufacturer's recommendations before rough grinding.

G. Rough Grinding: Grind with 24 grit silicon carbide or 24 grit turbo diamonds until all terrazzo strips and marble chips are uniformly exposed.

H. Grouting, Polishing and Sealing:
   1. Cleanse floor with clean water and rinse.
   2. Remove excess rinse water by wet vacuum, dry and fill voids with Epoxy Matrix or Clear Resin with a broadcast of limestone filler.
   3. Allow grout to cure.
   4. With 200 grit diamond polishing pads or aesthetic equivalent. All grout should be removed from the surface and terrazzo density should reflect a minimum of 70 percent aggregate exposure.
   5. Terrazzo installer to provide protection as specified (Masonite or ram board.) Protection to be maintained by the Construction Manager, until date of Substantial Completion or Owner occupancy.

3.04 PRECAST TERRAZZO INSTALLATION

A. Install precast units using method recommended by NTMA and manufacturer's written instructions, unless otherwise indicated.

B. Seal joints between units with joint sealants.

3.05 CLEANING AND SEALING

A. Remove grinding dust from installation and wash all surfaces with manufacturer's recommended neutral cleaner.

B. Apply slip and stain-resistant sealer that is chemically neutral with a pH factor between 7 and 10, that meets a standard coefficient of friction of 0.5 or higher, as measured by the James Machine (ASTM D2047 Test Method), does not affect physical properties of terrazzo and complies with NTMA's "Terrazzo Specifications and Design Guide."

3.06 PROTECTION

A. Protect finished terrazzo from damage and deterioration due to subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

B. Prohibit traffic on terrazzo after installation for period of time recommended by manufacturer.

END OF SECTION

SECTION 09 67 00
FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing, delivering, and installing the following fluid-applied flooring work:
   1. Fluid-applied flooring and base.
   2. Accessories for a complete system installation.

B. Coordinate with Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete, to install fluid-applied flooring products in compliance with warranty requirements.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.

B. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov.

C. CFR. Code of Federal Regulations: www.govinfo.gov.

D. EPA. Environmental Protection Agency: www.epa.gov.

E. ICRI. International Concrete Repair Institute: www.concrete.org.

1.03 REFERENCE STANDARDS

A. Editions of listed Standards as referenced by applicable codes; if no edition is referenced, the current edition of the following.

B. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

C. ASTM C307 - Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

D. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

E. ASTM C580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

F. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

G. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

H. EPA Method 24 - Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings.

I. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available; and documentation that epoxy flooring system is suitable for installation on concrete without requiring testing of moisture emission rate, relative humidity, or alkalinity (pH)..
   2. Samples: Submit two samples, 3 by 3 inch in size illustrating color and pattern for each floor material for each color specified.
   3. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and application rate for each coat.

4. Material Certificates: For each resinous flooring component, from manufacturer, stating that product complies with these specifications.
5. Material Test Reports: For each fluid-applied flooring system.
6. Applicator's Qualification Statement: signed by manufacturer, certifying that applicator complies with specified requirements.
7. Specimen warranty: for each fluid-applied flooring system.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
a. Include documentation of:
1) Post-Consumer and Pre-Consumer Recycled Content.
2) Environmental Product Declarations (EPD).
3) Health Product Declarations (HPD).
4) VOC content and CAL (CDPH SM) emissions testing compliance of adhesives and sealants.
5) CAL (CDPH SM) Emissions testing compliance of flooring.

D. Closeout Submittals
1. Submit in accordance with the following:
a. Section 01 70 00 - Execution and Closeout Requirements.
b. Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, related product data and MSDS sheets, and suggested schedule for cleaning.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
a. See Section 01 60 00 - Product Requirements, for additional provisions.
b. Extra Top Coat Materials: (2) one-gallon containers, or (1) five-gallon container of each color installed.
4. Warranty: Submit executed warranty for each fluid-applied flooring system, completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this section.
1. Minimum three years of documented experience.
2. Approved by manufacturer.

B. Single Source Responsibility: Obtain each type of fluid-applied flooring products from single manufacturer.

1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Construct in-place mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
1. Number of Mock-Ups to be Prepared: One of each type of fluid-applied flooring, including 4 inch minimum cove base.

2. Use same materials and methods for use in the work.
3. Locate where directed.
4. Minimum Size: 48 inches by 48 inches.

C. Obtain approval of mock-up by Architect before proceeding with work.

D. Approved mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store resin materials in a dry, secure area, and in compliance with manufacturer's recommendations for storage.

1.08 FIELD CONDITIONS

A. Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.

B. Utilities, including electricity, water, heat (air temperature between 60 and 85 degrees F) and finished lighting to be supplied by Construction Manager.

C. Job area to be free of other trades during, and for a period of 24 hours, after floor installation.

D. Maintain minimum temperature in storage area as recommended by manufacturer.

E. Store materials in area of installation for minimum period of 72 hours prior to installation to achieve temperature stability.

F. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

1.09 WARRANTY

A. Manufacturer / Special Warranty:
1. Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
2. Product: Provide manufacturer's written material warranties on epoxy flooring.
3. Warranty period shall begin on date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Flooring: Subject to compliance with these specifications, provide products of one of the following:
1. Crossfield Products Corp; Dex-o-Tex: www.crossfieldproducts.com.
2. Key Resin Company: www.keyresin.com.
3. The Sherwin-Williams Company: www.sherwin-williams.com. (Basis of Design)
4. Sika Corporation: www.sikafloorusa.com.
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 FLUID-APPLIED FLOORING SYSTEMS

A. Fluid-Applied Flooring Type EPX-1: Not used.

B. Fluid-Applied Flooring Types EPX-2A, EPX-2B: High-build, chemical-resistant protective self-leveling system utilizing high solids binder resins; with selected flake or quartz aggregates with polyaspartic topcoat.
1. Aggregate: Flake (EPX-2A) or quartz (EPX-2B), as selected by Architect.
2. Total System Thickness: 3/16 inch, nominal.
3. Texture: Slip resistant.
4. Flake or Aggregate Color: As selected by Architect.
5. Pigment Color: As selected by Architect.

6. Hardness at 24 hours, Shore D: 80 minimum.
7. Mildew Resistance: No growth.
8. Compressive Strength: 6100 minimum, when tested in accordance with ASTM C579.
9. Tensile Strength: 1000 psi minimum, when tested in accordance with ASTM C307.
10. Flexural Strength: 2000 psi minimum, when tested in accordance with ASTM C580.
11. Abrasion Resistance: loss of 45 mg maximum, when tested in accordance with ASTM D4060.
12. VOC Content: Provide fluid-applied flooring systems that comply with project's LEED goals and the following limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    a. Fluid-Applied Flooring Systems: Less than 50 g/L . See Section 01 81 13 - Sustainable Design Requirements.
13. Fluid-applied flooring system shall be inherently moisture-resistant to 99 percent RH minimum, and suitable for installation on concrete without requiring testing of moisture emission rate, relative humidity, or alkalinity (pH).
14. Basis of Design System:
    a. Crossfield Products Corp; Dex-O-Tex - Tek-Crete SL-B: www.crossfieldproducts.com.
        1) Basecoat (3/16 inch): Tek-Crete SL-B
        2) First Broadcast: Flake or Quartz, as selected by Architect.
        3) Bonding Coat: Decor-Flor.
        4) Second Broadcast: Flake or Quartz, as selected by Architect.
        5) Grout Coat: Decor-Flor.
        6) Topcoat: Quick Glaze.
    b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.03 ACCESSORIES

A. Cant Strips: Molded of flooring resin material.
B. Bond Breaker: Fiberglass Reinforcing tape at isolation joints for cove base locations.
C. Subfloor Filler: Type recommended by fluid-applied flooring manufacturer.
D. Primer: Type recommended by fluid-applied flooring manufacturer: see Basis of Design system(s), above.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.
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 flooring.
C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.
D. Verify that required floor-mounted utilities, if any, are in correct location.

3.02 PREPARATION

A. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
B. Prepare concrete surfaces according to ICRI 310.2R.
C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

D. Vacuum clean substrate.
E. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION - ACCESSORIES

A. Install cant strips at base of walls where flooring is to be extended up wall as base.
B. Install bond breaker at isolation joints for cove base locations.

3.04 INSTALLATION - FLOORING

A. Apply in accordance with manufacturer's instructions.
B. Apply each coat to minimum thickness required by manufacturer.
C. Finish to smooth level surface.
D. Cove at vertical surfaces.
    1. Height of base: 4 inches.

3.05 PROTECTION

A. Protection of finished floor from damage by subsequent trades shall be the responsibility of the Construction Manager.
    1. Prohibit traffic on floor finish for 48 hours after installation.
    2. Barricade area to protect flooring until fully cured.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Remove excess adhesive from floor, base, and wall surfaces, without damage.
C. Clean, and provide initial preparation, maintenance, and other requirements, for initial occupancy, in accordance with manufacturer's instructions.

END OF SECTION

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing, delivering, and installing the following tile carpeting work:
   1. Tile carpeting, fully adhered.
   2. Tile format walk-off carpet.
   3. Accessories for a complete system installation.

B. Coordinate with Section 03 30 05 - Moisture Vapor Reducing Admixture for Cast-in-Place Concrete, to install fluid-applied flooring products in compliance with warranty requirements.

1.02 ABBREVIATIONS AND ACRONYMS

A. AATCC. Association of Textile, Apparel, and Materials Professionals; www.aatcc.org.
B. ANSI. American National Standards Institute; www.ansi.org.
C. ASTM. ASTM International; www.astm.org.
D. CAL (CDPH). California Department of Public Health; www.cdph.ca.gov.
E. CRI. Carpet and Rug Institute; www.carpet-rug.org.
F. ISO. International Organization for Standardization; www.iso.org.
G. MGL. Massachusetts General Laws; www.malegislature.gov.
H. NFPA. National Fire Protection Association; www.nfpa.org.
I. NSF. NSF International; www.nsf.org.
J. SCS. Sustainable Global Services; www.scsglobalservices.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. AATCC Test Method 16 - Colorfastness to Light.
C. AATCC Test Method 129 - Colorfastness to Ozone in the Atmosphere Under High Humidities.
D. AATCC Test Method 134 - Test Method for Electrostatic Propensity of Carpets.
E. AATCC Test Method 164 - Colorfastness to Oxides of Nitrogen in the Atmosphere Under High Humidities.
F. AATCC Test Method 165 - Colorfastness to Crocking: Textile Floor Coverings-Crockmeter Method.
G. AATCC Test Method 174 - Antimicrobial Activity Assessment of New Carpets.
H. AATCC TM16.1 - Test Method for Colorfastness to Light: Outdoor.
I. AATCC TM16.3 - Test Method for Colorfastness to Light: Xenon-Arc.
J. ASTM D1335 - Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
K. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
L. ASTM D3936 - Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.
M. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
N. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
O. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

P. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
Q. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute..
R. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute.
S. CRI 104 - Standard for Installation of Commercial Carpet.
T. CRI TARR - Texture Appearance Retention Ratings.
U. ISO 2551 - Machine-Made Textile Floor Coverings -- Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions.
V. MGL, Part 1, Title II, Chapter 21A, Section 28 - Protection from Harmful Flame Retardants.
W. CRI (GLP) - Green Label Plus Testing Program - Certified Products.
X. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
Y. NFPA 258 - Recommended Practice for Determining Smoke Generation of Solid Materials.
Z. NSF/ANSI 140 - Sustainability Assessment for Carpet.
AA. SCS (CPD) - SCS Certified Products.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
    1. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
    2. Shop Drawings shall indicate:
        a. Doorways, enclosing walls or partitions, and locations where cutouts are required in carpet tiles.
        b. Layout of joints.
        c. Direction of carpet pile.
        d. Layout of flat wire systems.
        e. Method of joining seams.
        f. Carpet tile type, color, and dye lot.
        g. Type of installation.
        h. Pattern of installation.
        i. Pattern type, location, and direction.
        j. Type, color, and location of edge, transition, and other accessory strips.
        k. Transition details to other flooring materials.
    3. Samples: Submit three full-size tiles of each type of tile carpeting and tile format walk-off carpet tiles illustrating color and pattern design for each carpet color selected.
    4. Accessory Samples: Submit two 12 inch long samples of each type of edge strip, base cap, stair nosing, and other accessory stripping.
    5. Installer's Qualification Statement.
    6. Manufacturer's lab documents for physical testing.
    7. Specimen warranties.
C. Sustainability Submittals
    1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional

prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-Consumer and Pre-Consumer Recycled Content.
        2) Environmental Product Declarations (EPD).
        3) Health Product Declarations (HPD).
        4) VOC content and CAL (CDPH SM). Emissions testing compliance of adhesives and sealants.
        5) CAL (CDPH SM) Emissions testing compliance of flooring.

D. Closeout Submittals
1. Submit in accordance with the following:
    a. Section 01 70 00 - Execution and Closeout Requirements.
2. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, suggested schedule for cleaning, related product data and MSDS sheets, and directions for product use.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. See Section 01 60 00 - Product Requirements, for additional provisions.
    b. Extra tile carpeting and tile format walk-off carpet: Quantity equal to 5 percent of total installed of each color and pattern installed, from same product run, packaged with protective covering for storage and identified with labels describing contents.
4. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

B. Single Source Responsibility: Obtain primary carpet flooring materials through one source from a single manufacturer.
1. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials, unless otherwise specified.

C. Regulatory Requirements
1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
    a. Critical Radiant Flux Classification: Class I; not less than 0.45 W/cm2.
2. Smoke Density per ASTM E662 or NFPA 258: 450 or less.
    a. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
3. Protection From Harmful Flame Retardants:
    a. Products shall comply with MGL, Part 1, Title II, Chapter 21A, Section 28.

D. VOC Requirements: Products shall comply with project's LEED goals and applicable state and local requirements.
1. See Section 01 81 13 - Sustainable Design Requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements.

B. Comply with CRI 104, and manufacturer's instructions and recommendations.

1.07 FIELD CONDITIONS

A. Ambient Conditions per CRI 104, manufacturer's written recommendations, and as follows:
   1. New concrete slabs shall be flat, clean and dry.
   2. Environmental Limitations: Do not deliver or install until building is enclosed, wet work is complete, and HVAC system has been operating a minimum of two weeks, consistently maintaining temperature and relative humidity at occupancy levels per ASHRAE Std 55 (Figure 5.2.1.1.), per manufacturer's recommendations.

B. Store materials in area of installation for minimum period of 24 hours prior to installation.

C. Ventilate installation area during installation and for 72 hours after installation.

1.08 WARRANTY

A. Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.

B. Provide manufacturer's standard limited warranty against excessive wear, backing delamination, colorfastness, and edge ravel.
   1. Warranty Period for Tile Carpeting: 15 years minimum or manufacturers standard published warranty (whichever is greater) from date of Substantial Completion.
   2. Warranty Period for Tile Format Walk Off Carpet: three years minimum or manufacturers standard published warranty (whichever is greater) from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile Carpeting: Subject to compliance with these specifications provide products of one of the following:
   1. Interface, Inc: www.interface.com.
   2. Mannington Commercial: www.manningtoncommercial.com.
   3. Mohawk Group: www.mohawkgroup.com.
   4. Patcraft; Lithic: www.patcraft.com. (Basis of Design)
   5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Tile Format Walk-Off Carpet: Subject to compliance with these specifications provide products of one of the following:
   1. Interface, Inc.: www.interfaceinc.com.
   2. Mannington Commercial; www.manningtoncommercial.com.
   3. The Mohawk Group, Walk-Off Systems: www.mohawkgroup.com.
   4. Patcraft; Paseo Modular: Paseo Modular I0316: www.patcraft.com. (Basis of Design)
   5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 MATERIALS

A. Tile Carpeting, Type TILE-1: Tufted, tip shear, manufactured in one color dye lot.
   1. Tile size: 18 by 36 inch, nominal.
   2. Finished pile height: 0.15 inch.
   3. Color and pattern: To be selected by Architect from manufacturer's full range.
   4. Installation pattern: Ashlar.
   5. Static Electricity: AATCC Test Method 134, 20 percent R.H., 70F. less than 3.5KV.
   6. Tufts: 7.5 per square inch, minimum.
   7. Tufted Face Weight: 25 oz/sq yd, minimum.

8. Average Density (Finished): 6,000, minimum.
9. Light Fastness: AATCC Test Method 16: greater than 4.0 at 80 hours.
10. Backing Material: Manufacturer's standard reinforced thermoplastic laminate, PVC-free.
11. Total Weight: 96.9 oz/sq yd.
12. Recycled Content:
    a. Backing: 60 percent pre-consumer, 0.0 percent post-consumer.
13. Crocking: AATCC Test Method 165, greater than 4.0 Wet or Dry.
14. Texture Appearance Retention Rating (CRI TARR); Heavy traffic end use applications.
15. Indoor Air Quality - CRI (GLP); GLP7205, Carpet Category 13X.
16. Regulatory Requirements: See PART 1 QUALITY ASSURANCE Paragraph, above.

B. Tile Carpeting, Type TILE-2, -3, -4, -5, -6: Tufted, tip shear, manufactured in one color dye lot.
1. Tile size: 18 by 36 inch, nominal.
2. Finished pile height: 0.123 inch.
3. Color and pattern: To be selected by Architect from manufacturer's full range.
4. Installation pattern: Ashlar.
5. Static Electricity: AATCC Test Method 134, 20 percent R.H., 70F. less than 3.5KV.
6. Tufts: 10 per square inch, minimum.
7. Tufted Face Weight: 18 oz/sq yd, minimum.
8. Average Density (Finished): 5,268, minimum.
9. Light Fastness: AATCC Test Method 16: greater than 4.0 at 80 hours.
10. Backing Material: Manufacturer's standard reinforced thermoplastic laminate, PVC-free.
11. Total Weight: 96.9 oz/sq yd.
12. Recycled Content:
13. Crocking: AATCC Test Method 165, greater than 4.0 Wet or Dry.
14. Texture Appearance Retention Rating (CRI TARR); Heavy traffic end use applications.
15. Indoor Air Quality - CRI (GLP); GLP7205, Carpet Category 13X.
16. Regulatory Requirements: See PART 1 QUALITY ASSURANCE Paragraph, above.

C. Tile Format Walk-Off Carpet ("WOC"): Multi-Level Pattern Loop
1. Product Size: 24 by 24 inches nominal.
2. Product Type: Modular.
3. Color and Pattern: To be selected by Architect from manufacturer's full line.
4. Installation Pattern: Ashlar.
5. Fiber Content: Nylon 100 percent trilobal, minimum 24 denier per filament DPF nylon 6.
6. Primary Backing: Non-woven synthetic, PVC-free.
7. Secondary Backing: High performance precoat laminated to a proprietary thermoplastic polyolefin compound with a fiberglass reinforced layer. and be SCS (CPD) / NSF/ANSI 140 Platinum certified. Backing should be recyclable, PVC free, free of 4-PCH, brominated flame retardants, and phthalate plasticizers.
8. Dye Method: 100 percent solution dyed.
9. Gauge: 1/12.
10. Stitches per Inch: 11.
11. Pile Thickness: 0.134.
12. Surface Pile Weight: 32 oz.
13. Density: 8597 minimum.
14. Applied Soil-Resistance Treatment: manufacturer's applied soil protection.

15. Total Weight: 104 oz for finished carpet tile.
16. Recycled Content: Minimum of 45 percent recycled content: 20 percent pre-consumer recycled content and 25 percent post-consumer recycled content.
    a. Backing: Minimum of 40 percent recycled content.
17. ADA Compliance: Shall meet ADA and State accessibility guidelines for minimum static coefficient of friction of 0.6 for accessible routes.
18. Traffic Class: Severe (CRI TARR).
19. Performance Characteristics:
    a. Tuft Bind: Not less than 8 lbf (36 N) according to ASTM D1335.
    b. Delamination: Not less than 3.5 lbf/in. according to ASTM D3936.
    c. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
    d. Dimensional Stability: 0.119 percent or less according to ISO 2551 (Aachen Test).
    e. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC Test Method 129 and AATCC Test Method 164.
    f. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC Test Method 16, Option E.
    g. Electrostatic Propensity: Less than 3.5 kV according to AATCC Test Method 134.
    h. Antimicrobial Assessment: Passes AATCC Test Method 174.
    i. Regulatory Requirements: See PART 1 QUALITY ASSURANCE Paragraph, above.

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex-modified Portland cement-based formulation; type recommended by flooring material manufacturer, and meeting project's VOC requirements.
B. Primer for Substrate: As recommended in writing by adhesive manufacturer for substrate.
C. Adhesives:
    1. Water-resistant, mildew-resistant, non-staining type compatible with materials being adhered and with subfloor conditions indicated, complying with flammability requirements for installed carpet, and recommended or provided by carpet and carpet cushion manufacturers.
        a. Compatible with materials being adhered; maximum VOC content as specified in Section 01 81 13 - Sustainable Design Requirements.
    2. Seam Adhesive: Hot-melt adhesive tape, or other method as recommended by carpet manufacturer for sealing and taping seams, and butting cut edges at backing to form secure seams, and to prevent pile loss at seams.
D. Carpet tape: Used to connect loose carpet tiles to form area rugs.
    1. Manufacturer/ Product: Subject to compliance with requirements, provide products by one of the following:
        a. Mannington/FreLock Tabs.
        b. Shaw/LocWorx Tabs.
        c. Tandus/ Tandus Tape.
        d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions shall be per CRI 104, Section 01 40 00 - Quality Requirements, Section 01 70 00 - Execution and Closeout Requirements and as follows:

1. Carefully examine installation areas with installer/applicator present, for compliance with requirements affecting work performance.
    a. Verify that field measurements, surfaces, substrates, utilities, deflection, tolerances, levelness, plumbness, temperature, humidity, moisture content level, cleanliness and other conditions are per the manufacturer's requirements, and ready to receive work of this section.
        1) Verify that surfaces are free of cracks that might telegraph through flooring,
        2) Verify that surfaces are free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
        3) Verify that substrate is flat to within 3/16 inch in 10 feet (4.69mm in 3m) and within the equivalent of 1/32 inch in 12 inches (0.78mm per 0.3m) per ASTM F710.
        4) Where flatness and levelness tolerances deviate from manufacturer requirements, provide floor leveling toppings to bring substrate withing manufacturer tolerances.
    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. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

B. Cementitious Sub-Floor Surfaces: Concrete slabs are treated with concrete vapor mitigation admixtures; testing of slabs for moisture and humidity is not required.

C. Verify that required floor-mounted utilities, if any, are in correct location.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers, in accordance with CRI 104, Section 01 40 00 - Quality Requirements, Section 01 70 00 - Execution and Closeout Requirements, and as follows:
    1. Prepare substrates to ensure proper adhesion of the carpet flooring system.
    2. Concrete Substrates: Prepare according to ASTM F710.
        a. Verify the substrate is permanently dry, clean, smooth, and structurally sound.
        b. Substrate shall be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, curing, sealing, hardening, or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that might prevent adhesive bond.
        c. See Section 03 30 00 - Cast-in-Place Concrete for concrete substrate specifications.
    3. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, silicone, or curing compounds using mechanical methods recommended by manufacturer.
        a. Use only non-chemical mechanical methods, such as steam vacuuming, bead blasting or abrasive cleaning, to completely remove bond breaker materials from the concrete surface.
        b. Removal procedures shall be completed a minimum 48 hours prior to starting concrete testing.
        c. Sweep and vacuum substrate just prior to installation.
    4. Remove subfloor ridges and bumps. Fill and patch each construction seam, indentation, minor or local low spot, crack, joint, hole, and other irregularity or defect within the surrounding substrate with Portland cement-based subfloor filler.
        a. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
        b. Sand patched areas smooth after material is cured.

5. Self-Leveling Toppings: If floor slabs are not within flatness or levelness tolerances, provide self-leveling toppings as described in Section 03 54 00 - Concrete Toppings and as recommended in writing by carpet / adhesive manufacturer.
6. Prime Substrate: If bond test fails, prepare and apply primer coating using type as recommended by adhesive manufacturer for substrate.
7. Expansion joints, isolation joints or other moving joints in concrete shall not be filled with patching compound nor covered with carpet flooring.
8. Sweep and vacuum clean flooring substrates immediately prior to primer installation, and just before installing carpet flooring, after primer has cured. If no primer is used sweep just prior to carpet installation.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.
B. Install carpet tile and accessories according to the drawings and in accordance with manufacturer's instructions and CRI 104 (Commercial) and CRI (GLA), and the following:
   1. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements.
   2. Blend carpet from different cartons to ensure minimal variation in color match.
   3. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
   4. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
   5. Locate change of color or pattern between rooms under door centerline.
   6. Fully adhere carpet tile tight and flat to substrate. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive. Roll with appropriate roller for complete contact of adhesive to carpet backing.
   7. Apply seam adhesive to the base of the edge glued down. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
   8. Trim carpet tile neatly at walls and around interruptions.

3.04 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
B. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
C. Immediately after carpet installation perform the following operations:
   1. Remove excess adhesive, seam sealer, and other surface blemishes, without damage, from floor, base, and wall surfaces, using cleaner recommended by carpet manufacturer and meeting CRI (GLA).
   2. Remove yarns that protrude from carpet surface.
   3. Clean and vacuum carpet surfaces using commercial machine with face-beater element and HEPA filter.

3.05 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner Occupancy, whichever occurs first.
B. Protect installed work to comply with CRI 104 until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 09 72 00
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Surface preparation.
   2. Custom digital graphic wall coverings.
   3. Accessories required for a complete installation, including but not limited to adhesive, wood termination trim, metal transition and edge strips, substrate filler, and primer sealer.

B. Coordinate with work provided by the following sections:
   1. Section 09 91 23 - Interior Painting: Priming of surfaces to receive wall coverings.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.

B. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov.

C. GA. Gypsum Association: www.gypsum.org.

D. SCAQMD. South Coast Air Quality Management District: www.aqmd.gov.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM F2034 - Standard Specification for Sheet Linoleum Floor Covering.

E. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

F. GA-214 - Levels of Finish for Gypsum Panel Products.

G. SCAQMD 1168 - Adhesive and Sealant Applications.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide data on wall covering and adhesive.
   2. Shop Drawings: Indicate wall elevations with seaming layout.
   3. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.
   4. Installer's Qualification Statement.
   5. Specimen warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. Except as otherwise noted, the Construction Manager shall provide all documentation indicating applicability of products of this section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:

1) Post-Consumer and Pre-Consumer Recycled Content.
2) Environmental Product Declarations (EPD).
3) Health Product Declarations (HPD).
4) Low-Emitting Materials: Document that materials do not exceed VOC limits of either the CAL (CDPH SM) including addenda, or adhesives, sealants and sealant primers must comply with SCAQMD 1168 including amendments. Refer to Section 01 81 13 - Sustainable Design Requirements.
   (a) Paints and Coatings, and adhesives and sealants: Products used within the building waterproofing barrier layer.

D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.
   2. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.
   3. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.
   4. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
      a. See Section 01 60 00 - Product Requirements, for additional provisions.
      b. Extra Wall Covering Materials: 25 linear feet of each color and pattern of wall covering; store where directed.
         1) Package and label each roll by manufacturer, color and pattern, and destination room number.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish each type of wall coverings and accessories from one manufacturer for entire project.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Provide panel, two panel drops wide, full height, illustrating installed wall covering and joint seaming technique.
C. Locate where directed by Architect.
D. Accepted mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Inspect roll materials at arrival on site, to verify acceptability.
B. Protect packaged adhesive from temperature cycling and cold temperatures.
C. Do not store roll goods on end.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Warranty for Custom Digital Graphic Wall Covering: Provide manufacturer's warranty with a minimum term of five years, executed in Owner's name and registered with manufacturer.

PART 2 PRODUCTS

2.01 WALL COVERINGS

A. General Requirements:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
   2. Chemical and Stain Resistance: No visible staining or discoloration and no damage to surface texture when tested in accordance with ASTM D1308.

B. Custom Digital Graphic Wall Covering - Type (GWC):
   1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
      a. Designtex; CW11 DNA: www.designtex.com.
      b. DreamScape; Novalon: dreamscapewalls.com. (Basis of Design)
      c. Momentum; Digital Creations: www.momentumtextilesandwalls.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Locations: As indicated on drawings.
   3. Composition: PVC-free, non-vinyl.
   4. Wallcovering Classification: Meeting characteristics of Type II, except minimum total weight shall be as indicated below.
   5. Dimensions: As indicated on drawings. Provide wall covering in quantity and configuration to allow for eight inches extra at each side for trimming.
   6. Total thickness: .017 to .026 inch.
   7. Total weight: 16 ounces per linear yard minimum.
   8. Roll width: 50 to 54 inches.
   9. Flammability: Meets Tunnel test ASTM E84.
   10. Pattern: Custom, from digital images. Images and arrangement and layout of images will be provided by Architect.
   11. Surface texture: Smooth.
   12. Panel Edge Treatment: Square.

C. Adhesive: Wallcovering manufacturer's recommended CAL (CDPH SM) compliant field-applied type clear, strippable adhesive compatible with applicable substrate(s).

D. Wood Termination Trim: See Section 06 20 00 - Finish Carpentry , and drawings, for trim locations and profiles.

E. Metal Transition and Edge Strips, Basis of Design products:
   1. Base and Termination: Fry Reglet, WCTBT125.
   2. Field: Fry Reglet, WCTF125.
   3. Outside Corner: Fry Reglet, WCTOSC.

F. Substrate Filler: Type recommended by adhesive and wall covering manufacturers; compatible with applicable substrate(s).

G. Primer Sealer: Wallcovering manufacturer's recommended CAL (CDPH SM) compliant type compatible with applicable substrate(s).

H. Gypsum board finish: Level 5. Coordinate with Section 09 21 16 - Gypsum Board Assemblies .

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions:

1. See Section 01 40 00 - Quality Requirements.
2. Carefully examine installation areas with installer/applicator present, for compliance with requirements affecting work performance.
3. Commencement of work of this section constitutes acceptance of substrate conditions.

B. Examine surfaces scheduled to be finished prior to commencement of work. Verify that substrate surface conditions meet or exceed a Level 5 finish, per GA-214, and that surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer. Report any condition that may potentially affect proper application.

C. Verify that permanent lighting is installed and operational prior to installation of wall coverings.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.

E. Verify flatness tolerance of surfaces is in accordance with wall covering manufacturer's recommendations, or does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft, whichever is more stringent.

3.02 PREPARATION

A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.

B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.

C. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.

E. Marks: Seal with manufacturer's recommended compatible and LEED-compliant sealing product those that may bleed through surface finishes.

F. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.

G. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

A. Comply with manufacturer's written instructions for installation.

B. Apply adhesive and wall covering in accordance with manufacturer's instructions.

C. Material shall be cut to size on location, to fit exact wall dimensions. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.

D. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.

E. Horizontal seams are not acceptable.

F. Do not seam within 2 inches of internal corners or within 6 inches of external corners.

G. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.

H. Do not install wall covering more than 1/4 inch below top of resilient base.

I. Cover spaces above and below windows, above doors, in pattern sequence from roll.

J. Wall covering is required behind fin tube cabinets and convector covers.

K. Where wall covering tucks into reveals, or metal wallboard or plaster stops, apply with contact adhesive within 6 inches of wall covering termination. Ensure full contact bond.

L. Install wood termination trim.

M. Install metal transition and edge strips.

N. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet, by methods recommended by adhesive and wall coverings manufacturers.

3.04 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Finish touch-up damaged surface finishes.
   2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants, by methods recommended by wallcovering manufacturer.
C. Reinstall wall plates and accessories removed prior to work of this section.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner, whichever comes first.

END OF SECTION

SECTION 09 84 30
ACOUSTIC WALL AND CEILING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following acoustic wall and ceiling unit work as specified and as indicated in the drawings, including:
   1. Sound-absorbing panels.
   2. Sound-absorbing ceiling baffles.
   3. Mounting brackets, fasteners, and other accessories needed for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.

B. CISCA. The Ceilings and Interior Systems Construction Association; www.cisca.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. CISCA (AC) - Acoustical Ceilings: Use and Practice.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Manufacturer's printed data sheets for products specified, including
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Installation methods.
   2. Shop Drawings: Fabrication and installation details, panel layout, fabric orientation, and wood grain orientation.
   3. Selection Samples: Manufacturer's color charts for fabric covering, indicating full range of fabrics, colors, and patterns available.
   4. Verification Samples: Submit three materials samples and full assemblies of each type of panel specified; 12 by 12 inch, representing in all respects the minimum quality of work to be furnished by the manufacturer, showing:
      a. Joint connection and edge details.
      b. Support bracket system, and fasteners.
      c. Bends, folds and corners of fabric wrapping.
      d. Color and texture of fabric wrapping selected.
   5. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical and fire performance.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:

D. Closeout Submittals
    1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
    2. Maintenance Data: Manufacturer's maintenance and cleaning instructions.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish each type of sound absorbing units from one manufacturer for entire project, unless otherwise acceptable to Architect.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 - Product Requirements, and the following:
    1. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation.
    2. Store units flat, in dry, well-ventilated space; do not stand on end.
    3. Protect edges from damage.
    4. Panels that become wet will become rejected as damaged, and shall be removed from the site and replaced. Protect liquid adhesive from freezing.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Meet or exceed requirements of applicable State code.

B. Acoustical Absorption: Perform testing in accordance with ASTM C423, Type A mounting method unless otherwise specified.

C. Flame Spread Rating: Provide all components with Class A flame spread rating when tested in accordance with ASTM E84, unless otherwise specified.

2.02 FABRIC-COVERED SOUND-ABSORBING UNITS

A. Manufacturers: Subject to compliance with these Specifications and project's LEED goals, provide products from one of the following:
    1. Ecophon; Akusto Texona: www.ecophon.com.
    2. Knauf; Ecose: www.knaufnorthamerica.com.
    3. Sound Concepts; Type AP Impact Acoustical Panels: www.soundconceptscan.com.
    4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. General:
    1. Prefinished, factory assembled fabric-covered panels.
    2. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

C. Fabric-Covered Acoustical Panels for Walls and Ceilings:
    1. Core Density of Fiberglass or Mineral Wool Insulation: 6 to 10 lb/cu ft.
    2. Panel Size: as indicated on Drawings.
    3. Panel Thickness: As required to meet required acoustical performance.
    4. Corners: Square.
    5. Fabric: Woven polyester.

6. Color and Patterns: As selected by Architect from manufacturer's full range of fabrics compatible with assemblies' flame specified flame spread rating, smoke developed index, and sustainability requirements.
7. Patterns: Where fabric with directional or repeating patterns or fabric with directional weave is used, mark for installation in same direction.
8. Mounting Method: Back-mounted with mechanical fasteners, Type A per ASTM E795.

D. Fabric-Covered Acoustical Ceiling Baffles:
1. Baffle Core: Manufacturer's standard rigid or semi-rigid fiberglass core.
2. Acoustical Performance: 1.38 Sabins per square foot.
3. Baffle Thickness: As required to meet required acoustical performance.
4. Panel Weight: 1 pound per square foot.
5. Surface Finish: Scrim with factory-applied paint on face and sides. Top of panel to be unfinished with embedded hanging clips.
6. Fire Performance: ASTM E84 Class A: Flame Spread 25 or under, Smoke Developed 50 or less.
7. Mounting: Vertically suspended from ceiling or structure with 1/16 inch diameter galvanized aircraft cable, by preassembled metal hanging clips in tops of panels.

2.03 FABRICATION

A. Fabric Wrapped, General: Fabricate panels to sizes and configurations as indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
1. Where radiused or mitered corners are indicated, install fabric to avoid seams or gathering of material.

B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width, and squareness from corner to corner.

2.04 ACCESSORIES

A. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, and as follows:
1. Two-part clip and base-support bracket system; brackets designed to support full weight of panels and clips designed for lateral support, with one part mechanically attached to back of panel and the other attached to substrate.

B. Ceiling-Suspended Accessories: Manufacturer's standard accessories at locations as indicated on each acoustical unit, sized appropriately for weight of acoustical unit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of acoustical units.
1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
a. Examine substrates for conditions detrimental to installation of acoustical units. Verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, cleanliness and other conditions are ready to receive work.
b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.

B. Install mounting accessories and supports in accordance with shop drawings.

C. Suspend ceiling baffles at locations and heights as indicated.

D. Acoustical wall panels furnished to Section 06 20 00 - Finish Carpentry for installation in accordance with Drawings, manufacturer's instructions, submittals, and as follows:
   1. Install two-part clip and base-support bracket system to substrate, plumb and level.
   2. Scribe panels to fit accurately at adjoining work and penetrations.
   3. Align panels accurately, with edges plumb and top edges level.
   4. Securely anchor panel to bracket system.

E. Acoustic Vertical Panel Baffles furnished to Section 06 20 00 - Finish Carpentry for installation in accordance with Drawings, manufacturer's instructions, submittals, CISCA (AC), and as follows:
   1. Secure suspension aircraft cable to the underside of building structure excluding floor deck, above the ACP ceiling system.
   2. Notch ACP ceiling tiles to receive cable directly adjacent to ACP grid system.

3.03 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore in place damaged items prior to inspection for Substantial Completion.
   1. Finish touch-up damaged surface finishes.
   2. Replace damaged materials, components, and whole panels with new if cleaning or repair not acceptable to Architect.

3.04 CLEANING

A. Clean sound-absorptive panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

B. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

C. Remove surplus materials, trimmed portions of panels, and debris resulting from installation.

3.05 PROTECTION

A. Provide protection of installed acoustical panels until date of Substantial Completion.

B. Replace panels that cannot be cleaned and repaired satisfactorily for Architect's acceptance.

END OF SECTION

SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Painting Trade Bid. See Section 09 00 07 - Painting Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Furnish all labor, materials and installation of painting and coating systems as shown on the drawings and/or as specified herein, including but not limited to the following:
   1. Surface preparation.
   2. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including but not limited to the following:
      a. Preparatory work of materials and surfaces to receive painting or finishing beyond that specified to be done as work of other sections, shall be included as work of this section 09 91 13.
      b. Surfaces shall be painted or finished except as specifically excluded under the requirements of this section, regardless of any conflicts which may occur between these requirements and local trade practices.
      c. Exterior site features indicated in the drawings to be painted, including but not limited to handrails at site stairs, pipe bollards, ramps, and guardrails at loading dock, and other site amenities that do not include a factory finish.
      d. Exterior face of hollow metal doors and frames.
      e. Exposed surfaces of steel lintels and relieving angles.
      f. Exposed structural steel.
      g. Exposed PVC piping at roofs and other locations.
      h. Mechanical and electrical equipment and related components such as rooftop units, transformers, generators, shut offs, and conduit.
         1) On the roof and outdoors, paint equipment exposed to weather or to view, including factory-finished materials.

B. Do not paint or finish the following items:
   1. Items factory-finished, unless factory finish is required to be painted out to match adjacent surface finish, or unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Non-metallic roofing and flashing of any type, and pre-finished and stainless steel flashings.
   6. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
   7. Marble, granite, slate, and other natural stones.
   8. Slabs on grade, unless specifically indicated.
   9. Ceramic and other types of tiles.
   10. Brick, terracotta, glass unit masonry, precast architectural concrete, cast stone, integrally colored plaster and stucco, unless specifically indicated to be painted.
   11. Glass.
   12. Do not paint over tags or plates on mechanical equipment.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 ABBREVIATIONS AND ACRONYMS

A. ASTM: ASTM International; www.astm.org.
B. CDPH: California Department of Public Health; www.cdph.ca.gov.
C. MPI: Master Painters Institute; www.paintinfo.com.
D. OTC: Ozone Transport Commission; www.otcair.com.
E. PDCA: Painting and Decorating Contractors of America; www.pdca.org.
F. SSPC: The Society for Protective Coatings; www.sspc.org.

1.05 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes; if no edition is referenced, the current edition of the following.
B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating.
D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials.
E. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
F. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.
G. OTC Model Rule, AIM - Architectural, Industrial, and Maintenance Coatings.
H. PDCA P5 - Benchmark Sample Procedures for Paint and Other Decorative Coating Systems.
I. SSPC-SP 1 - Solvent Cleaning.
J. SSPC-SP 2 - Hand Tool Cleaning.
K. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning.
L. SSPC-SP 13/NACE No.6 - Surface Preparation of Concrete.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
    1. Product Data: Provide complete list of products to be used, with the following information for each:
        a. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
        b. Cross-reference to specified paint system products to be used in project; include description of each system. Include applicable paint system number from PART 2 of this specification section - i.e. 'Paint System "A"'
    2. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
        a. Where sheen is specified, submit samples in only that sheen.
        b. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
        c. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, wall panel systems, and factory finished metals, have been accepted.
    3. Samples: Submit three samples of each field-applied stain or clear finish 6 by 9 inches in size, illustrating selected sheen and coloration, prepared on each specified wood substrate indicated.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Painting Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Environmental Product Declarations (EPD).
         2) Health Product Declarations (HPD).
         3) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.
   2. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
   3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
      a. See Section 01 60 00 - Product Requirements, for additional provisions.
      b. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run. Store where directed by Owner.
         1) Label each container with color, in addition to the manufacturer's label.
      c. Provide two binders of drawdown colors.

1.07 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish paint materials and products in each paint system from one manufacturer for entire project.

B. Sustainability Standards Certifications:
   1. VOC Requirements: Products shall meet LEED for Schools v4/v4.1 and OTC Model Rule, AIM limits.

C. Notify Architect if a specified product does not appear to be compatible with project-specific substrate, durability or performance expectations.

1.08 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements , for general requirements for mock-ups.

B. Benchmark Installation: Provide one full finish-coat benchmark installation of each type of paint, coating, and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
   1. Architect to select one surface to represent surfaces and conditions for each type of coating and substrate to be painted.
      a. Wall Surfaces: Provide samples on at least 100 square feet of wall surface.
      b. Small Areas and Items: Architect will designate an item or area per specific project conditions.

2. After permanent lighting and other services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
    a. After finishes are accepted, Architect will use the surface to evaluate coating systems of a similar nature in other areas of the work.
3. Final approval of colors by Architect will be from job-applied benchmarks.

C. Accepted mock-up may remain as part of the work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as indicated by manufacturer's instructions.

D. Storage spaces shall be kept clean and neat. Oily rags shall be removed and disposed of each day, and all other necessary precautions shall be taken to avoid fires.

E. Maintain a fire extinguisher in paint mixing and storage area.

1.10 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior, unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.

B. Paints: Subject to compliance with these specifications, provide products of one of the following:
1. Benjamin Moore: www.benjaminmoore.com.
2. PPG Paints: www.ppgpaints.com.
3. Sherwin-Williams Company: www.sherwin-williams.com. (Basis of Design, except as otherwise noted in PAINT SYSTEMS - EXTERIOR paragraph, below)
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE / DESIGN CRITERIA

A. Color and Life of Film: Color of all surfaces finished under this Section shall, at the end of one year, have remained free from fading, and variations and shall be uniform.
1. All materials shall have their original adherence at the end of one year, and there shall be no evidence of blisters, running, peeling, scaling, caulking, streaks or stains at the end of this period.

2. Washing with alkali-free soap and water shall remove surface dirt without producing any deterioration effects.

2.03 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 81 13 - Sustainable Design Requirements.
   1. Determination of VOC Content: Compliance claims must include the amount applied in mass per surface area and state the range of total VOCs (tVOCs) after 14 days measured as indicated in the CAL (CDPH SM).

C. Flammability: Comply with applicable code for surface burning characteristics.

2.04 PAINT SYSTEMS - EXTERIOR

A. Paint System "A" (Ferrous Metals) (Gloss):
   1. Benjamin Moore:
      a. One Coat: Benjamin Moore Acrylic Metal Primer HP 1100.
      b. Two Coats: Benjamin Moore DTM Acrylic Enamel Gloss HP3300.
   2. PPG Paints:
      a. One Coat: Pitt-Tech Plus EP Interior / Exterior DTM Industrial Primer 90-1908.
      b. Two Coats: PPG Paints Pitt-Tech Plus EP DTM Industrial Enamel, 90-1510 Series, Gloss.
   3. Sherwin Williams:
      a. One Coat: Pro Industrial Pro-Cryl Universal Primer B66.
      b. Two Coats: Pro Industrial Urethane Alkyd Enamel B54W00151.

B. Paint System "B" (Galvanized Metal) (Gloss):
   1. Benjamin Moore:
      a. One Coat: Benjamin Moore Acrylic Metal Primer HP 1100.
      b. Two Coats: Benjamin Moore DTM Acrylic Enamel Gloss HP3300.
   2. PPG Paints:
      a. One Coat: Pitt-Tech Plus EP Interior / Exterior DTM Industrial Primer 90-1908.
      b. Two Coats: PPG Paints Pitt-Tech Plus EP DTM Industrial Enamel, 90-1510 Series, Gloss.
   3. Sherwin Williams:
      a. One Coat: Pro Industrial Pro-Cryl Universal Primer B66.
      b. Two Coats: Pro Industrial Urethane Alkyd Enamel B54W00151.

C. Paint System "C": Not Used.

D. Paint System "D" (PVC - Piping including vents, flues, and other exposed piping, and architectural trim) (Acrylic Satin):

1. Benjamin Moore:
    a. One Coat: Insl-x Stix Waterborne Bonding Primer.
    b. Two Coats: Ultra Spec® EXT SXA-110.
2. PPG Paints:
    a. Two Coats: BreakThrough! 50 Interior/Exterior Satin Waterborne Acrylic V52-410.
3. Sherwin Williams:
    a. One Coat: Extreme Bond Primer.
    b. Two Coats: Pro Industrial DTM Acrylic B66.

E. Paint System "E" (Wood) (Waterborne Semi-Transparent Stain):
1. Benjamin Moore:
    a. Two Coats: Woodluxe Water Based Waterproofing Stain + Sealer Semi-Transparent Flat 692.
2. PPG Paints:
    a. Two Coats: Flood Semi-Transparent Acrylic-Oil Wood Finish, FLD 812/832 Series.
3. Sherwin Williams:
    a. Two Coats: Woodscapes Semi-Transparent or Solid A15 Series.

F. Paint System "F" (Wood: Pressed Board, Hard Board, Particle Board) (Acrylic Satin):
1. Benjamin Moore:
    a. One Coat: Fresh Start High Hiding All-Purpose Primer 046.
    b. Two Coats: Ultra Spec® EXT N448.
2. PPG Paints:
    a. One Coat: Seal Grip Interior/Exterior Acrylic Primer 17-921XI.
    b. Two coats: Sun Proof Exterior Latex, 76-110XI Series, Satin.
3. Sherwin Williams:
    a. One Coat: PrepRite® ProBlock® Interior-Exterior Latex Primer-Sealer B51-600 Series.
    b. Two Coats: SuperPaint Exterior Latex A89-1100 Series.

G. Paint System "G" (Exposed Concrete) (Acrylic Satin):
1. Benjamin Moore:
    a. One Coat: Ultra Spec® Masonry Interior/Exterior, Hi-Build Block Filler 0571.
    b. Two Coats: Ultra Spec® EXT Satin Finish N448.
2. PPG Paints:
    a. One Coat: PPG Perma-Crete Block Surfacer Filler 4-100XI.
    b. Two Coats: Sun Proof Exterior Latex, 76-110XI Series, Satin
3. Sherwin Williams:
    a. One Coat: ProBlock Primer.
    b. Two Coats: Super Paint Exterior A89-1100 Series.

H. Paint System "H" (Exposed Concrete Masonry Units) (Acrylic Satin):
1. Benjamin Moore:
    a. One Coat: Ultra Spec Hi-Build Masonry Block Filler 571.
    b. Two Coats: Ultra Spec EXT Satin Finish.
2. PPG Paints:
    a. One Coat: Perma-Crete Block Surfacer Filler 4-100XI.
    b. Two Coats: Sun Proof Exterior Latex, 76-110XI Series, Satin.
3. Sherwin Williams:
    a. One Coat: Loxon Block Surfacer, A24W200.

b. Two Coats: Super Paint Exterior A89-1100 Series.

I. Paint System "I": (Not Used)

J. Paint System "J": Brick (opaque finish) (Acrylic Satin):
   1. Benjamin Moore:
      a. One Coat: Ultra Spec Hi-Build Masonry Block Filler 571.
      b. Two Coats: Ultra Spec EXT Satin Finish.
   2. PPG Paints:
      a. One Coat: Perma-Crete Interior/Exterior Alkai-Resistant Primer 4-603XI.
      b. Two Coats: Sun Proof Exterior Latex, 76-110XI Series, Satin.
   3. Sherwin Williams:
      a. One Coat: Loxon Masonry Primer, A24W8300.
      b. Two Coats: Super Paint Exterior A89-1100 Series.

K. Paint System "K": Exterior Concrete or Concrete Masonry Units where "Elastomeric Coating" is indicated on drawings (Acrylic Elastomeric Low Lustre):
   1. Benjamin Moore:
      a. One Coat: Ultra Spec Hi-Build Masonry Block Filler 571.
      b. Two Coats: Ultra Spec Masonry Elastomeric Waterproof Coating Low Lustre 360.
   2. PPG Paints:
      a. One Coat: Perma-Crete Interior/Exterior Alkali-Resistant Primer 4-603XI.
      b. Two Coats: Perma-Crete Pitt-Flex Elastomeric Coating - Smooth 4-110.
   3. Sherwin Williams:
      a. One Coat: Loxon Block Surfacer, A24W200.
      b. Two Coats: ConFlex XL Elastomeric High Build Coating, A5-400.

L. Paint System "L": Exposed Steel where "High Performance Coating" is indicated on drawings (Aliphatic Urethane Gloss):
   1. Benjamin Moore:
      a. One Coat: HP 1550 Concrete and Metal Epoxy Primer.
      b. Two Coats: HP Aliphatic Acrylic Urethane HP5000.
   2. PPG Paints:
      a. One Coat: Amerlock 2VOC Fast Dry, High Solids Epoxy.
      b. Two Coats: Amershield VOC Polyester-Acrylic Aliphatic Polyurethane.
   3. Sherwin Williams:
      a. One Coat: Macropoxy 646.
      b. Two Coats: Acrolon 100.

M. Paint System "M": Not Used.

N. Paint System "N": Exterior Gypsum Board:
   1. Benjamin Moore:
      a. One Coat: Fresh Start High Hiding All-Purpose Primer 046. Provide two coats for purple gypsum board.
      b. Two Coats: Ultra Spec® EXT Satin Finish W448.
   2. PPG Paints:
      a. One Coat: Seal Grip Interior/Exterior Acrylic Primer 17-921XI.
      b. Two Coats: Sun Proof Exterior Latex, 78-110XI Series.
   3. Sherwin Williams:
      a. Satin Finish - Early Moisture Resistant Finish:

1) PrepRite® ProBlock® Interior-Exterior Latex Primer-Sealer B51-600 Series. Provide two coats for purple gypsum board.
2) Two Coats: Latitude Exterior Acrylic Latex Satin, K62W00651K43 Series.

2.05 PRIMERS

A. Primers shall be by the same manufacturer as top coat(s) material. Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer. Primers shall be identifiable in the manufacturers product data as compatible with substrate and top coat(s).

B. Back Primers for Woodwork:
   1. Back Primer for Opaque-Finished Woodwork, Exterior: SuPrime Exterior Alkyd Wood Primer.
   2. Back Primer for Transparent-Finished Woodwork: Same as finish coat.

2.06 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions:
   1. See Section 01 40 00 - Quality Requirements.
   2. Carefully examine installation areas with installer/applicator present, for compliance with requirements affecting work performance.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums, or maximums indicated by finish manufacturers, whichever is lower:
   1. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
   2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
   3. Concrete Floors and Traffic Surfaces: 8 percent.

F. Test concrete, masonry and plaster surfaces for alkalinity. Alkalinity shall not exceed each paint manufacturer’s recommended pH.

G. Furnish, maintain and remove all scaffolding, ladders and planks required for this work and all drop cloths for the protection of concrete walks, floors, prefinished materials, building fixtures, pavement, landscaping, and all other permanent items.
   1. Painted and finished surfaces subject to damage or defacement due to other work on the building shall be properly protected and covered.
   2. Painting Trade Contractor shall be responsible for any and all damage to painted work and to that of other work caused by operations under this section.

H. Painting Trade Contractor shall be required to replace any unsatisfactory work caused by improper or defective surfaces, per direction of Architect, at no additional cost to Owner.

3.02 PREPARATION

A. No priming or painting of wood shall be permitted on or in building areas where unit masonry is being installed, restored, cleaned, or is in the process of drying.

B. Clean surfaces thoroughly and correct defects prior to application.
C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
D. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
E. Seal surfaces that might cause bleed through or staining of topcoat.
F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
G. Concrete:
    1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
    2. Clean concrete according to ASTM D4258. Allow to dry.
    3. Prepare surface as recommended by top coat manufacturer and in accordance with SSPC-SP 13/NACE No.6.
H. Masonry:
    1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
    2. Prepare surface as recommended by top coat manufacturer.
I. Exterior Gypsum Board: Fill minor defects with exterior filler compound. Spot prime defects after repair.
J. Galvanized Surfaces:
    1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
    2. Prepare surface according to SSPC-SP 2.
K. Ferrous Metal:
    1. Solvent clean according to SSPC-SP 1.
    2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
    3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning in accordance with SSPC-SP 6/NACE No.3SSPC-SP 6. Protect from corrosion until coated.
L. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.
M. Exterior Wood to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces.
N. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.
O. Verify paints are compatible with sealants that are intended to be painted.

3.03 APPLICATION

A. All painting shall be done by skilled and experienced painters, working under the supervision of a capable foreperson. All materials shall be applied in accordance with the manufacturer's directions and materials shall be thinned only for the proper workability and in compliance with the manufacturer's specifications. All material shall be evenly applied without runs or sagging, and free from drops, ridges, laps and brush marks.

B. Completed painting sections shall be free of blistering, running, peeling, scaling, streaks and stains and the colors of all surfaces shall remain free from fading.
C. Painting shall include all exposed surfaces of every member. Parts to be painted, inaccessible after installation, shall be painted before installation. Priming shall include all sides, edges and cut ends.
D. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
E. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than two weeks after installation of woodwork, apply primer within two weeks and final coating within four weeks.
F. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
G. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
H. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew. Allow applied coats to dry before next coat is applied.
I. Apply each coat to uniform appearance.
J. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
K. Sand wood and metal surfaces lightly between coats to achieve required finish.
L. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
M. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
N. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. All waste paint materials shall be separated and recycled. Collect waste paint by type and provide for delivery to recycling or collection facility.
C. Excess paint and coating materials that cannot be reused shall be legally disposed of in a manner compliant with all applicable hazardous and other waste disposal regulations for each product type.
D. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
E. Eliminate contaminants entering waterways, sanitary/storm drain systems or into the ground from construction activities. Strictly adhere to the following procedures:
    1. Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
    2. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
    3. Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
    4. Empty paint cans are to be dry prior to disposal or recycling (where available).

5. Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well-ventilated fire-safe area at moderate temperature.

F. Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

G. Upon completion of the paintwork, Painting Trade Contractor shall remove from the premises and dispose of all scaffolding, equipment and surplus material. Remove empty containers and other debris resulting from work of this section.

H. Painting Trade Contractor shall leave all glass areas, surfaces, floors and walls, hardware and any other surfaces clean from any paint, stain, spatterings, smears or smudges which are the result of Painting Trade Contractor's operations, taking care not to mar surfaces of items being cleaned. Painting Trade Contractor shall replace glass damaged by Painting Trade Contractor's operations.

I. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Touch-up or repaint surfaces damaged during subsequent construction operations or identified as unacceptable in punch-list inspections.

END OF SECTION

SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Painting Trade Bid. See Section 09 00 07 - Painting Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Furnish all labor, materials and installation of painting and coating systems as shown on the drawings and/or as specified herein, including but not limited to the following:
   1. Preparation of surfaces to be painted.
   2. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including but not limited to the following:
      a. Preparatory work of materials and surfaces to receive painting or finishing, except where specifically assigned by these specifications to be done as work of other sections.
      b. Surfaces shall be painted or finished except as specifically excluded under the requirements of this section, regardless of any conflicts which may occur between these requirements and local trade practices.
      c. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
      d. Elevator pit ladders.
      e. Prime surfaces to receive wall coverings.
      f. Exposed structure at the building interior, including underside of steel roof deck, structural roof framing, joists, and _____.
      g. Mechanical and Electrical:
         1) In finished areas, paint insulated and exposed pipes including sprinkler piping, exposed roof drain leaders, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and _____, unless otherwise indicated.
         2) In all areas, paint shop-primed items.
         3) 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 paint to visible surfaces.

B. Do not paint or finish the following items:
   1. Items factory-finished, unless factory finish is required to be painted out to match adjacent surface finish, or unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Door tags or other objects that bear fire-rating labels or information; equipment serial number, capacity labels, and other tags and plates on equipment; bar code labels; and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
   6. Marble, granite, slate, and other natural stones.
   7. Floors, unless specifically indicated.
   8. Ceramic and other tiles.
   9. Brick, architectural concrete, cast stone, integrally colored plaster, and stucco.

10. Glass.
11. Acoustical materials, unless specifically indicated.
12. Concealed pipes, ducts, and conduits.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.
B. CAL (CDPH). California Department of Public Health: www.cdph.ca.gov.
C. MPI. Master Painters Institute: www.paintinfo.com.
D. OTC. (VOC Limits) Ozone Transportation Commission: www.otcair.org.
E. PDCA. Painting and Decorating Contractors of America: www.pdca.org.
F. SCAQMD. South Coast Air Quality Management District: www.aqmd.gov.
G. SSPC. The Society for Protective Coatings: www.sspc.org/standards/scopes.html.

1.05 REFERENCE STANDARDS

A. Editions of listed reference standards as referenced by applicable codes; if no edition is referenced, the current edition of the following.
B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
C. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test.
D. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating.
E. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials.
F. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
G. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.
H. OTC Model Rule, AIM - Architectural, Industrial, and Maintenance Coatings.
I. PDCA P5 - Benchmark Sample Procedures for Paint and Other Decorative Coating Systems.
J. SCAQMD 1113 - Architectural Coatings.
K. SSPC-SP 1 - Solvent Cleaning.
L. SSPC-SP 13/NACE No.6 - Surface Preparation of Concrete.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
    1. Product Data: Provide complete list of products to be used, with the following information for each:
        a. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
        b. Cross-reference to specified paint system products to be used in project; include description of each system. Include applicable paint system number from PART 2 of this specification section - i.e. 'Paint System "A"'
    2. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
        a. Where sheen is specified, submit samples in only that sheen.
        b. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.

c. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as resilient flooring, wall base, masonry, wood casework, wood doors, prefinished components, and ___, have been accepted.

3. Samples: Submit three samples of each field-applied stain or clear finish 6 by 9 inches in size, illustrating selected sheen and coloration, prepared on each specified wood substrate indicated.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Painting Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Environmental Product Declarations (EPD).
        2) Health Product Declarations (HPD).
        3) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals

1. Submit in accordance with the following:
    a. Section 01 70 00 - Execution and Closeout Requirements.
    b. Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Submit data including recommended maintenance guidelines including care and cleaning instructions and maintenance schedule, touch-up procedures, repair of painted and finished surfaces, and basic Owner requirements to maintain warranties.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. See Section 01 60 00 - Product Requirements, for additional provisions.
    b. Extra Paint and Finish Materials: One gallon of each color; from the same product run. Store where directed.
    c. Label each container with color in addition to the manufacturer's label.
    d. Provide two binders of drawdown colors.

1.07 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish paint materials and products in each paint system from one manufacturer for entire project.

B. Sustainability Standards Certifications:

1. VOC Requirements: Paints and coatings applied inside the building waterproofing system shall meet limits stated in Section 01 81 13 - Sustainable Design Requirements and current editions of the following standards:
    a. OTC Model Rule, AIM limits.
    b. CAL (CDPH SM) v1.1 or v1.2.
    c. SCAQMD 1113.

C. Notify Architect if a specified product does not appear to be compatible with project-specific substrate, durability or performance expectations.

1.08 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-ups.

B. Benchmark Installation: Provide one full finish-coat benchmark installation of each type and color of interior paint for walls and finish for interior trim, for Architect and Owner acceptance. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
   1. Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.
      a. Wall Surfaces: Provide samples of at least 5 feet wide by 5 feet high of painted wall surface.
      b. Small Areas and Items: Architect will designate an item or area per requirements of specific project conditions.
   2. After permanent lighting and other services have been activated, apply coatings in selected room or to each surface according to the schedule or as specified. Provide required sheen, color, and texture on each surface.
      a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature in other areas of the work.
   3. Final approval of colors by Architect will be from job-applied benchmarks.
C. Accepted mock-up may remain as part of the work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as indicated by manufacturer's instructions.
D. Storage space shall be kept clean and neat. Oily rags shall be removed and disposed of each day, and all other necessary precautions shall be taken to avoid fires.
E. Maintain a fire extinguisher in paint mixing and storage area.

1.10 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.
D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior, unless required otherwise by manufacturer's instructions.
F. Provide lighting level of 80 fc measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible,.
B. Paints: Subject to compliance with these specifications, provide products of one of the following:
   1. Benjamin Moore: www.benjaminmoore.com.
   2. PPG Paints: www.ppgpaints.com.
   3. Sherwin-Williams Company: www.sherwin-williams.com. (Basis of Design, except as otherwise noted in PAINT SYSTEMS - INTERIOR paragraph, below.)

4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE / DESIGN CRITERIA

A. Color and Life of Film: Color of all surfaces finished under this Section shall, at the end of one year, have remained free from fading, and variations and shall be uniform.
   1. All materials shall have their original adherence at the end of one year, and there shall be no evidence of blisters, running, peeling, scaling, caulking, streaks or stains at the end of this period.
   2. Washing with alkali-free soap and water shall remove surface dirt without producing deterioration effects.

2.03 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 81 13 - Sustainable Design Requirements.
   1. Determination of VOC Content: Compliance claims must include the amount applied in mass per surface area and state the range of total VOCs (tVOCs) after 14 days measured as indicated in the CAL (CDPH SM).

C. Flammability: Comply with applicable code for surface burning characteristics.

2.04 PAINT SYSTEMS - INTERIOR

A. Paint Schedule - Interior:
   1. The following schedule applies to all surfaces not otherwise scheduled to receive finish by other trades.
      a. Paint System "1" Gypsum Board; paper faced, Moisture Resistant, and unfaced (Eggshell 10-20 at 60 degrees):
         1) Benjamin Moore:
            (a) One Coat: Ultra Spec 500 Interior Latex Primer N534. Provide two coats on purple gypsum board.
            (b) Two Coats: Ultra Spec 500 Low Sheen Eggshell T537.
         2) PPG Paints:
            (a) One Coat: Speedhide Zero Interior Zero VOC Latex Sealer 6-4900XI. Provide two coats on purple gypsum board.
            (b) Two Coats: Speedhide Zero VOC Interior Latex 6-3511ZV, satin.
         3) Sherwin Williams:
            (a) One Coat, PrepRite ProBlock Interior/Exterior Latex Primer/Sealer B51W00620.
            (b) Two Coats: ProMar 200 Zero VOC Low Gloss Egg Shell B20W12651.

b. Paint System "2" Concrete block and pitted/non-smooth concrete surfaces - dry areas (Satin 35 at 60 degrees):
   1) Benjamin Moore:
      (a) One Coat: Ultra Spec Masonry Interior / Exterior Block Filler 571.
      (b) Two Coats: Ultra Spec 500 Interior Satin Pearl T545.
   2) PPG Paints:
      (a) One Coat: Speedhide Interior/Exterior Masonry Hi-Fill Latex Block Filler 6-15XI
      (b) Two Coats: Speedhide Zero VOC Lo-Lustre 6-3011ZV.
   3) Sherwin Williams:
      (a) One Coat: Pro Industrial Heavy Duty Block Filler B42W00150.
      (b) Two Coats: Pro Industrial Water Based Pre-Catalyzed Epoxy Semi-Gloss K46 Series.
c. Paint System "3" Gypsum Board; paper faced, Moisture Resistant, and unfaced - Epoxy (Eggshell 10-20 at 60 degrees):
   1) Benjamin Moore:
      (a) One Coat, except on purple gypsum board provide two coats: Fresh Start High-Hiding All-Purpose Primer 046.
      (b) Two Coats: Pre Catalyzed Waterborne Epoxy Semi-Gloss HP3410.
   2) PPG Paints:
      (a) One Coat, except on purple gypsum board provide two coats: Speedhide Zero Interior Zero VOC Latex Sealer 6-4900XI.
      (b) Two Coats: Pitt-Glaze WB1 Interior Eg-Shel Pre-Catalyzed Waterborne Acrylic Epoxy 16-1310.
   3) Sherwin Williams:
      (a) One Coat, except on purple gypsum board provide two coats: PrepRite ProBlock Interior/Exterior Latex Primer/Sealer B51W00620.
      (b) Two Coats: Pro Industrial Water-Based Catalyzed Epoxy B73-360.
d. Paint System "4" Concrete block and pitted / non-smooth concrete surfaces - epoxy: (Eggshell 10-20 at 60 degrees):
   1) Benjamin Moore:
      (a) One Coat: Ultra Spec Masonry Interior / Exterior Block Filler 571.
      (b) Two Coats: Pre-Catalyzed Waterborne Epoxy Semi-Gloss HP3410.
   2) PPG Paints:
      (a) One Coat: Speedhide Interior/Exterior Masonry Hi-Fill Latex Block Filler 6-15XI.
      (b) Two Coats: Pitt-Glaze WB1 Interior Pre-Catalyzed Waterborne Acrylic Epoxy 16-1310.
   3) Sherwin Williams:
      (a) One Coat: Pro Industrial Heavy Duty Block Filler B42W00150.
      (b) Two Coats: Pro Industrial Water Based Catalyzed Epoxy B73-360.
e. Paint System "5" Shop-Primed Metal, Ferrous Metal, Aluminum, Galvanized Metal (Semi-gloss 40-50 at 60 degrees):
   1) Benjamin Moore:
      (a) One Coat: Ultra Spec HP Acrylic Metal Primer HP1100.
      (b) Two Coats: DTM Acrylic Enamel Semi-Gloss HP3310.
   2) PPG Paints:
      (a) One Coat: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1908.

(b) Two Coats: Pitt-Tech Plus EP WB DTM Industrial Enamel, 90-1610 Series Semi-Gloss.

3) Sherwin Williams:

(a) One Coat: Pro Industrial™ Pro-Cryl® Universal Primer, B66 Series.

(b) Two Coats: Pro Industrial DTM Acrylic B66-1150 Series.

f. Paint System “6" Aluminum, Galvanized Metal (Semi-gloss 40-50 at 60 degrees):

1) Benjamin Moore:

(a) One Coat: Acrylic Metal Primer HP1100.

(b) Two Coats: DTM Acrylic Enamel Semi-Gloss HP3310.

2) PPG Paints:

(a) One Coat: Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer 90-1908.

(b) Two Coats: Pitt-Tech Plus EP WB DTM Industrial Enamel, 90-1610 Series, Semi-Gloss.

3) Sherwin Williams:

(a) One Coat: Pro Industrial™ Pro-Cryl® Universal Primer, B66 Series.

(b) Two Coats: Pro Industrial DTM Acrylic B66-1150 Series.

g. Paint System "7" Wood trim, including paneling and doors (opaque): (Semi-gloss 40-50 at 60 degrees):

1) Benjamin Moore:

(a) One Coat: Benjamin Moore Ultra Spec 500 Interior latex N534

(b) Two Coats: Ultra Spec 500 Interior Semi Gloss T546.

2) PPG Paints:

(a) One Coat: Seal Grip Gripper Int/Ext 100 Percent Acrylic Primer 17-921XI.

(b) Two Coats: Speedhide Interior Zero VOC Latex 6-500ZV.

3) Sherwin Williams:

(a) One Coat: One Coat: PrepRite ProBlock Interior/Exterior Latex Primer/Sealer B51W00620.

(b) Two Coats: ProMar 200 Zero VOC Semi-Gloss B31-2600.

h. Paint System "8" Exposed structure, including underside of metal or concrete deck, structural steel, conduits, spray-applied cementitious fireproofing and similar items, greater than 10 feet above floor (Flat 0-10 at 85 degrees):

1) Benjamin Moore:

(a) Two Coats: Latex Dry Fall Flat 395.

2) PPG Paints:

(a) Two Coats: Speedhide SuperTech WB Interior Dry-Fog Latex 6-725XI.

3) Sherwin Williams:

(a) Two Coats: Pro Industrial Waterborne Acrylic Dryfall B42W81 Series.

i. Paint System "9" Wood floors and walk surfaces (hardboard or hardwood): (Eggshell/Satin 20-30 at 60 degrees):

1) Benjamin Moore:

(a) One Coat: Fresh Start High-Hiding All PurHigh-Hiding All Purpose Primer 046.

(b) Two Coats: Floor and Patio Latex Enamel Low Sheen 122.

2) PPG Paints:

(a) Two Coats: BreakThrough! Interior/Exterior Satin Water-Borne Acrylic V52-410.

3) Sherwin Williams:

(a) Two Coats: Armorseal 8100, Satin.

j. Paint System "10" Exposed vertical smooth concrete: (Eggshell 10-20 at 60 degrees):
   1) Benjamin Moore:
      (a) One Coat: Ultra Spec Masonry Interior/Exterior 100 Percent Acrylic Masonry Sealer 608.
      (b) Two Coats: Ultra Spec 500 Low Sheen Eggshell T537.
   2) PPG Paints:
      (a) One Coat: Seal Grip Interior/Exterior Universal Acrylic Primer Sealer 17-921XI.
      (b) Two Coats: Speedhide zero Interior Zero VOC Latex Satin 6-3511ZV.
   3) Sherwin Williams:
      (a) One Coat: Loxon Concrete and Masonry Primer/Sealer LX02W0050.
      (b) Two Coats: Pro Industrial DTM Acrylic Eggshell B66W01251.

k. Paint System “11” Exposed vertical pitted concrete: (Eggshell 10-20 at 60 degrees):
   1) Benjamin Moore:
      (a) One Coat: Ultra Spec Masonry Interior / Exterior 100 percent Acrylic Masonry Sealer 608.
      (b) Two Coats: Ultra Spec 500 Latex Eggshell T538.
   2) PPG Paints:
      (a) One Coat: Speedhide Interior/Exterior Masonry Hi-Fill Latex Block Filler 6-15XI.
      (b) Two Coats: Speedhide Zero Interior Zero VOC Latex Satin 6-3511ZV.
   3) Sherwin Williams:
      (a) One Coat: Pro Industrial Heavy Duty Block Filler B42W00150.
      (b) Two Coats: ProMar 200 Egg-Shell B20W12651.

l. Paint System "12" Exposed Interior Unglazed Brick: (Eggshell 10-20 at 60 degrees):
   1) Benjamin Moore:
      (a) One Coat: Ultra Spec Masonry Interior/Exterior 100 Percent Acrylic Masonry Sealer 608.
      (b) Two Coats: Ultra Spec 500 Low Sheen Eggshell T537.
   2) PPG Paints:
      (a) One Coat: One coat: Seal Grip Interior/Exterior Universal Acrylic Primer Sealer 17-921XI.
      (b) Two Coats: Speedhide zero Interior Zero VOC Latex Satin 6-3511ZV.
   3) Sherwin Williams:
      (a) One Coat: Loxon Concrete and Masonry Primer/Sealer LX02W0050.
      (b) Two Coats: ProMar 200 Egg-Shell B20W12651.

m. Paint System “13” Concrete Floors - epoxy paint; including slip-resistant additive (Satin 20-30 at 60 degrees):
   1) Benjamin Moore:
      (a) One Coat: Concrete and Metal Epoxy Primer.
      (b) Two Coats: Corotech Waterborne Amine Epoxy Gloss V440.
   2) PPG Paints:
      (a) Two Coats: Aquapon WB EP Ultra Low VOC Water Based Epoxy 98E-1 Series.
   3) Sherwin Williams:
      (a) One Coat: Resuprime 3579 Standard Epoxy Primer/Binder.
      (b) Two Coats: Armorseal 8100 with Shark Grip Additive (for non-vehicle traffic.)

n. Paint System “14” Plaster (Eggshell 10-20 at 60 degrees)
   1) Benjamin Moore:

(a) One Coat: Ultra Spec Masonry Interior/ Exterior 100 percent Acrylic Masonry Sealer 608.
(b) Two Coats: Ultra Spec 500 Latex Eggshell T538.

2) PPG Paints:
(a) One Coat: Seal Grip Interior/Exterior Universal Acrylic Primer Sealer 17-921XI.
(b) Two Coats: Speedhide Zero VOC Interior Latex 6-3511ZV.

3) Sherwin Williams:
(a) One Coat: PrepRite ProBlock Interior/Exterior Latex Primer/Sealer B51W00620.
(b) Two Coats: ProMar 200 Egg Shell B20W12651 Series.

o. Paint System "15" Floor Marking Paint (vehicular) - Traffic (Flat 0-10 at 85 degrees):
1) Benjamin Moore:
(a) One Coat: Insl-X Latex Traffic Paint TP-22 Series with Insl-X Sure Step.

2) PPG Paints:
(a) One Coat: Zoneline Traffic and Zone Marking Paint 11-53.

3) Sherwin Williams:
(a) One Coat: Resugard resinous flooring.

p. Paint System "16" One coat IdeaPaint Primer and one heavy coat IdeaPaint CREATE White.
1) Products: Subject to compliance with these specifications, provide products of one of the following:
(a) IdeaPaint Inc; CREATE White; www.ideapaint.com. (Basis of Design)
(b) Rust-Oleum; Product: Professional White Dry Erase Kit; www.rustoleum.com.
(c) ReMARKable; Product: White Dry-Erase Coating System; https://www.remarkablecoating.com.
(d) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2) Comply with manufacturer's directions for surface preparation and finish, and application of product.

3) Include one IdeaPaint Perch Pack for each educational space scheduled to receive IdeaPaint application. Kit shall include:
(a) One white Perch Wally wall mount: 10 inches wide by 0.31 inches deep by 10 inches tall.
(b) One white Perch Stumpy container: 9.39 inches wide by 3.39 inches deep by 4.41 inches tall.
(c) Two white Perch Bitsy magnetic containers: 3.68 inches wide by 3.11 inches deep by 4.41 inches tall.
(d) Four Command large strips
(e) Five Phillips flat head screws and five drywall anchors.
(f) One four-pack of multi-color dry erase markers.
(g) One 8-ounce cleaning spray.
(h) Two microfiber cleaning cloths.
(i) Two erasers.

q. Paint System "17" One coat IdeaPaint Primer and one heavy coat IdeaPaint CREATE Clear.

1) Products: Subject to compliance with these specifications, provide products of one of the following:
   (a) IdeaPaint Inc; CREATE Clear: www.ideapaint.com. (Basis of Design)
   (b) ReMARKable; Product: Clear Dry-Erase Coating System; https://www.remarkablecoating.com.
   (c) Sherwin-Williams; Product: SketchPad; http://www.sherwin-williams.com/architects-specifiers-designers/products/catalog/sketch-pad-dry-erase-coating.
   (d) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2) Comply with manufacturer's directions for surface preparation and finish, and application of product.
3) Include one IdeaPaint Perch Pack for each educational space scheduled to receive IdeaPaint application, to include all of the items as listed for Paint System "16" above.

r. Paint System "18" (Not Used)

s. Paint System "19" (Clear Floor Sealer - SLR-1).
   1) Products: Subject to compliance with these specifications, provide products of one of the following:
      (a) Benjamin Moore: Moisture Tolerant Quick Set Epoxy Sealant.
      (b) PPG Paints: Perma-Crete Plex-Seal WB 4-6200XI.
      (c) Sika Corporation; Scofield Cementone Clear Sealer: www.usa.sika.com. (Basis of Design)
      (d) Sherwin Williams: H&C™ Water-Based 2-Part Polyurethane Clear Coat.
      (e) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2) Provide manufacturer's recommended number of coats, but not less than two coats.

2.05 PRIMERS

A. Primers shall be by the same manufacturer as top coat(s) material. Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer. Primers shall be identifiable in the manufacturer's product data as compatible with substrate and top coat(s).

B. Back Primers for Woodwork:
   1. Back Primer for Transparent-Finished Woodwork: Same as finish coat.

2.06 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions:
   1. See Section 01 40 00 - Quality Requirements.

2. Carefully examine installation areas with installer/applicator present, for compliance with requirements affecting work performance.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums, or maximums indicated by finish manufacturers, whichever is lower::

1. Gypsum Wallboard: 12 percent.
2. Plaster and Stucco: 12 percent.
3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
5. Concrete Floors and Traffic Surfaces: 8 percent.

F. Test concrete, masonry and plaster surfaces for alkalinity. Alkalinity shall not exceed each paint manufacturer’s recommended pH.

G. Furnish, maintain and remove all scaffolding, ladders and planks required for this work and all drop cloths for the protection of concrete walks, floors, prefinished materials, building fixtures, and all other permanent items.

1. Painted and finished surfaces subject to damage or defacement due to other work on the building shall be properly protected and covered.
2. Painting Trade Contractor shall be responsible for any and all damage to painted work and to that of other work caused by operations under this section.

H. Painting Trade Contractor shall be required to replace any unsatisfactory work caused by improper or defective surfaces, per direction of Architect, at no additional cost to Owner.

3.02 PREPARATION

A. No priming or painting of wood shall be permitted on or in building areas where unit masonry is being installed or is in the process of drying.

B. Clean surfaces thoroughly and correct defects prior to application.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

D. Remove surface appurtenances, including electrical plates, hardware, hardware accessories, lighting fixture trim, escutcheons, fittings, and similar items, prior to preparing surfaces or finishing. Heating and other equipment adjacent to wall shall be disconnected and moved to permit surfaces to be painted, using workers skilled in applicable trades.

E. Seal surfaces that might cause bleed through or staining of topcoat.

1. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Concrete:

1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
2. Clean concrete according to ASTM D4258. Allow to dry.
3. Prepare surface as recommended by top coat manufacturer and in accordance with SSPC-SP 13/NACE No.6.

G. Masonry:

1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer.

H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

J. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high-alkali surfaces.

K. Galvanized Surfaces:
1. Remove all surface contamination, coatings, and oils from hot-dip galvanized surfaces that will prevent proper bond of paint using solvent cleaning methods.
2. Solvent clean steel decking and acid-etch wash or mechanically clean the surface to remove passivation and other coatings in a manner and with products acceptable to the paint manufacturer.

L. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning in accordance with SSPC-SP 6/NACE No.3SSPC-6. Protect from corrosion until coated.

M. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried. Sand between coats. Back prime concealed surfaces before installation.

N. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

O. Verify paints are compatible with sealants that are intended to be painted.

3.03 APPLICATION

A. All painting shall be done by skilled and experienced painters, working under the supervision of a capable foreperson. All materials shall be applied in accordance with the drawings, approved submittals, manufacturer's instructions, and materials shall be thinned only for the proper workability and in compliance with the manufacturer's specifications. All material shall be evenly applied without runs or sagging, and free from drops, ridges, laps and brush marks.

B. Completed painting sections shall be free of blistering, running, peeling, scaling, streaks and stains and the colors of all surfaces shall remain free from fading.

C. Painting shall include all exposed surfaces of every member. Parts to be painted, inaccessible after installation, shall be painted before installation. Priming shall include all sides, edges and cut ends.

D. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

E. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

F. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

G. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

H. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

I. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as are necessary for complete hide.

J. Sand wood and metal surfaces lightly between coats to achieve required finish.

K. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

L. All exposed structural steel, metal deck and other exposed unfinished surfaces shall be painted except for exposed items in existing spaces, which are to remain exposed unless noted otherwise.

M. All plywood backboards required or indicated at electrical and or telecommunications rooms, which are not scheduled as fire-retardant treated, shall receive a Class A fire retardant paint finish.

N. Interior Wood to Receive Transparent Finishes: See Section 06 20 00 - Finish Carpentry.

O. Exterior Doors: Finish inside of exterior hollow metal doors to match the exterior finish, as specified in Section 09 91 13 - Exterior Painting.

P. Door lite frames and grilles shall be painted. Architect to make color selection.

Q. Exposed Plumbing, Mechanical and Electrical Items: Items such as conduits, pipes, ducts, grilles, registers, vents, access panels and items of similar nature shall be finished to match adjacent wall and ceiling surfaces, unless otherwise directed. Confirm color with Architect prior to painting. Paint visible surfaces behind vents, registers, or grilles flat black. Wash exposed metal with solvent, and prime and paint spray paint wherever practicable. Do not paint concealed conduits, piping and ducts.

R. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing. Heating and other equipment that was disconnected and moved to permit surfaces to be painted, shall be expertly replaced and reconnected, using workers skilled in applicable trades.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

B. After preparation of metal decking is complete, paint a 100 square foot sample area of exposed metal decking, and conduct paint adhesion testing in three locations in accordance with ASTM D3359 Method A, achieving results of 3 or better in all. If Level 3 or better is not achieved, undertake additional surface cleaning and preparation of metal decking and repeat test procedure until satisfactory results are achieved.

C. Painting Trade Contractor shall be reponsible for redoing painting work that results in textured surfaces or other defects due to lack of thorough preparation and cleaning of walls prior to painting.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. All waste paint materials shall be separated and recycled. Collect waste paint by type and provide for delivery to recycling or collection facility.

C. Excess paint and coating materials that cannot be reused shall be legally disposed of in a manner compliant with all applicable hazardous and other waste disposal regulations for each product type.

D. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

E. Eliminate contaminants entering waterways, sanitary/storm drain systems or into the ground from construction activities. Strictly adhere to the following procedures:

1. Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.

2. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
3. Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
4. Empty paint cans are to be dry prior to disposal or recycling (where available).
5. Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well-ventilated fire-safe area at moderate temperature.

F. Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

G. Upon completion of the paintwork, Painting Trade Contractor shall remove from the premises and dispose of all scaffolding, equipment and surplus material. Remove empty containers and other debris resulting from work of this section.

H. Painting Trade Contractor shall leave all glass areas, surfaces, floors and walls, hardware and any other surfaces clean from any paint, stain, spatterings, smears or smudges which are the result of Painting Trade Contractor's operations, taking care not to mar surfaces of items being cleaned. Painting Trade Contractor shall replace glass damaged by Painting Trade Contractor's operations.

I. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Touch-up or repaint surfaces damaged during subsequent construction operations or identified as unacceptable in punch-list inspections.

END OF SECTION

SECTION 10 11 00
VISUAL DISPLAY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following visual display unit work as specified and as indicated in the drawings, including:
   1. Porcelain enamel steel markerboards.
   2. Tackboards.
   3. Combination units and units made of more than one panel.
   4. Accessories required for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International: www.astm.org.
B. CDPH. California Department of Public Health: www.cdph.ca.gov.
C. NFPA. National Fire Protection Association: www.nfpa.org.
D. PEI. Porcelain Enamel Institute: www.porcelainenamel.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
D. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.
E. PEI 1002 - Manual and Performance Specifications for Porcelain Enamel Writing Surfaces.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Product Data: Provide manufacturer's data on markerboards, tackboards and tackboard surface covering, tackless paper rails, trim, cores, backings, protective coatings, accessories, and use recommendations and limitations.
   2. Shop Drawings: Indicate wall elevations, dimensions, joint locations, and special anchor details.
   3. Samples: Three, 2 by 2 inches in size for each type of visual display unit, illustrating materials and finish, color and texture of markerboards, tackboards and tackboard surface covering,and trim.
   4. Test Reports: Show compliance with specified surface burning characteristics requirements.
   5. Specimen warranty for each type of visual display unit.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

a. Include documentation of:
1) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with the following:
a. Section 01 70 00 - Execution and Closeout Requirements.
b. Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Include data on regular cleaning, stain removal, and maintenance precautions.
3. Warranty: Executed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Flame and smoke rating per ASTM E84 and applicable building codes.
B. Single Source Responsibility: Furnish each type of visual display unit system from one manufacturer for entire project, unless otherwise acceptable to Architect.
1. If project has both markerboards and tackboards, provide markerboards and tackboards from a single manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 60 00 - Product Requirements.
B. Comply with manufacturer's instructions and recommendations.
C. Treat visual display boards in a manner which in no way affects the flatness of the boards, throughout the time prior to installation.

1.07 FIELD CONDITIONS

A. Field Measurement: Field measure prior to preparation of shop drawings and fabrication, to ensure proper fit.
B. Comply with manufacturer's recommendations for acclimating area for interior moisture and temperature to approximate normal occupied conditions.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide 50 year warranty for porcelain enamel steel markerboards to include warranty against discoloration due to cleaning, crazing or cracking, and staining.
C. Provide five year warranty for tackboards.

PART 2 PRODUCTS

2.01 VISUAL DISPLAY UNITS

A. Markerboards (MB): Porcelain enamel on steel, laminated to core per PEI 1002.
1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
a. MooreCo, Inc; "El Grande" Whiteboard, with deluxe aluminum trim: www.moorecoinc.com. (Basis of Design)
b. Platinum Visual; Writanium Markerboards; http://pvsusa.com.
c. Walker Products, Inc; www.walkermarkerboards.com.
d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2. Projection-type surface: Flatness of markerboard surface shall not exceed 5 mm or 0.2 inch of variation over the surface of the board.
3. Magnet-compatible.

4. Color: As selected by Architect from manufacturer's full range.
5. Fired-in musical scale lines: At rooms scheduled.
    a. Rules to be 1/8 inch width.
    b. Color of lines to be selected by Architect from manufacturer's full list.
    c. Provide standard ruling for music lines, treble and bass clef notes.
6. Core: Moisture-resistant. Bonded to porcelain face sheet with waterproof resin glue.
7. Backing: Aluminum sheet, 0.015 inch minimum, laminated to core.
8. Height: As indicated on drawings.
9. Length: As indicated on drawings.
10. Frame: Extruded aluminum, with concealed fasteners and reinforced corners.
    a. Frame Profile: Manufacturer's standard, with 7/16 inch profile.
    b. Frame Finish: Anodized, clear satin finish.
11. Accessories: Provide the following:
    a. Marker trays.
    b. Map rails.
    c. Flag holders.
12. At locations with larger than 60 inches minimum dimension in either direction, provide factory butt jointed marker surface resulting in monolithic surface.

B. Tackboards (TB): Colored linoleum laminated to hardboard or MDF backing; NFPA 285, Class II: ASTM E84, Class B.
    1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
        a. MooreCo, Inc: www.moorecoinc.com. (Basis of Design)
        b. Platinum Visual; Writanium Markerboards; http://pvsusa.com.
        c. Walker Products, Inc.: www.walkermarkerboards.com.
        d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
    2. Face Material: Self-healing linoleum cork, composed with natural linseed oil, granulated cork, rosin binders, and dry pigments.
    3. Color: As indicated on drawings, or if not indicated, as selected by Architect from manufacturer's full range of standard and custom colors. Refer to index of finishes for color designations.
    4. Backing: Hardboard or MDF, 1/4 inch thick, laminated to tack surface.
    5. Surface Burning Characteristics: Flame spread index of 75, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
    6. Height: As indicated on drawings.
    7. Length: As indicated on drawings.
    8. Frame: Extruded aluminum, with concealed fasteners.
        a. Frame Profile: Manufacturer's standard, with 3/4 inch face dimension.
        b. Frame Finish: Anodized, natural.
    9. Accessories: Provide the following:
        a. Map rails.
        b. Flag holders.

C. Combination Units and Units Made of More Than One Panel (MB-TB): Where markerboards and tackboards are shown on drawings as immediately adjacent, provide factory-assembled

combination markerboards and tackboards in a single frame with frame divider between surfaces: vertical orientation, of materials specified above.

2.02 ACCESSORIES

A. Map Rails: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.

B. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

C. Flag Holders: Cast aluminum bored to receive 1 inch diameter flag staff, bracketed to fit top rail of board. Include one flag holder at each classroom and teaching space, located at STE, FLEX, Music, Art.

D. Cleaning Instruction Plate: Provide instructions for markerboard cleaning on a metal plate fastened to perimeter frame near marker tray.

E. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.

F. Mounting Brackets: Concealed.

G. Visual display units shall be mechanically fastened to walls with manufacturer's recommended hardware for applicable substrate. Adhesive mounting of visual display units is not acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions shall be per Section 01 40 00 - Quality Requirements and as follows:

1. Carefully examine installation areas with installer / applicator present, for compliance with requirements affecting work performance.
    a. Verify that field measurements, substrates, structural support blocking, utility connections, tolerances, levelness, plumbness, moisture content level, cleanliness and other conditions are within tolerances required by the manufacturer, and ready to receive work.
        1) Verify that flatness of wall surface does not exceed markerboard manufacturer's recommendations for maintaining specified flatness of projection-type surface.
    b. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Secure units level and plumb.

C. Butt Joints: Install with tight hairline joints.

D. Use miter box to cut angles on trim around markerboards and tackboards.

3.04 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.

1. Finish touch-up damaged surface finishes.
2. Replace damaged materials and components with new if repair is not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean board surfaces in accordance with manufacturer's instructions.
C. Cover with protective cover, taped to frame.
D. Remove temporary protective cover at Date of Substantial Completion.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 10 14 16
PLAQUES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Plaques.
      a. Commemorative plaques.
      b. LEED plaques.
      c. Time capsule plaques.
   2. Hardware and accessories for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA. Americans with Disabilities Act; www.ada.gov.
B. ABA. Architectural Barriers Act; www.access-board.gov.
C. CDPH. California Department of Public Health; www.cdph.ca.gov.
D. CFR. Code of Federal Regulations; www.govinfo.gov.
E. ICC. International Code Council; www.iccsafe.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.
C. ADA Standards - 2010 ADA Standards for Accessible Design.
D. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
E. ICC A117.1 - Accessible and Usable Buildings and Facilities.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Manufacturer's product literature for each type of plaque, indicating style, font, foreground and background colors, locations, and overall dimensions of each sign.
      a. Signage Schedule: Provide information sufficient to completely define each sign for fabrications, including sign and letter sizes, fonts, colors, pictograms, and other text to be applied.
         1) When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
         2) Submit for approval by Owner through Architect prior to fabrication.
   2. Selection Samples: Where materials, colors, and finishes are not specified, submit two sets of color selection charts or chips.
   3. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
        2) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.05 MOCK-UPS

A. Provide Mock-ups for each different Signage type indicated by the Drawings, utilizing final specified materials and final production techniques. Install Mock-up in location acceptable to Architect for each type specified.
1. Notify Architect seven days in advance of time when mock-up will be tested and available for review.
2. Modify and/or replace mock-up(s) as many times as are necessary to obtain Architect’s approval.
3. Do not start work of this Section until each mock-up is reviewed and accepted by Owner and Architect.
4. Accepted mock-ups will be a Benchmark Installation used to indicate standard workmanship and pertinent details, and be used to comparatively judge the finished installation. Protect approved mock-up during construction period.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package plaques adequately to prevent damage before installation.
B. Store under cover and elevated above grade.

1.07 FIELD CONDITIONS

A. Do not install tape or sealant adhesives when ambient temperature is lower than recommended by manufacturer.
B. Maintain this minimum temperature during and after installation of signs.

1.08 WARRANTY

A. Manufacturer Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
1. Provide manufacturer's standard warranty for all signage, but not for less than the term specified in the conditions of the contract.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these specifications, provide products of one of the following:
1. Commemorative and Time Capsule Plaques:
    a. A.R.K. Ramos Architectural Signage Systems ; Cast Aluminum Plaque: www.arkramos.com.
    b. Cosco Industries; Cast Aluminum: www.coscoarchitecturalsigns.com.
    c. FASTSIGNS International, Inc: www.fastsigns.com.
    d. Gemini Incorporated; www.signletters.com.

e. Metallic Arts: www.metallicarts.com.
f. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2. LEED Plaques:
a. Green Plaque LLC: www.greenplaque.com.
b. Classic Glass Inc; custom fabrication: www.classicglassinc.com.
c. Glass Creations Unlimited; custom fabrication: www.glasscreations.net.
d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.03 MATERIALS

A. Metal Plaques:
1. Material: Bronze casting.
2. Material Thickness: Manufacturer's standard.
3. Mounting: Rosettes and toggle bolts.

B. Glass Plaques:
1. Material Thickness: 1/8 inch, minimum.
2. Mounting: Aluminum pegs, anodized.

C. Acrylic Plaques:
1. Material Thickness: 1/4 inch, minimum.
2. Mounting: Wall standoffs.

2.04 COMMEMORATIVE PLAQUES

A. Metal Plaques:
1. Material: Cast Bronze.
2. Edges: generally described as beveled or chamfered with raised border, to be selected from manufacturer's full range of available profiles.
3. Corners: Square, with no border articulation.
4. Background: Stipple texture.
5. Size: 18 inches high by 24 inches wide.
6. Font: To be selected from manufacturer's full range of available fonts.
a. Lettering to include, but not be limited to the following:
1) Project name.
2) Year of project completion.
3) Names of:
(a) School Superintendent.
(b) School Principal.
(c) Building Committee Members.
(d) Name of Construction Manager firm.
(e) Name of Architect firm.
(f) Name of Owner's Project Manager's firm.

4) Recognition of the funding source and any other public agencies involved in the project procurement, management, or ownership.

7. Finish: Satin bronze letters and borders with dark oxidized background with satin clear coat finish.
8. Mounting: Concealed.
9. Mounting: Exposed fasteners to match finish of surrounding sign area, as recommended by the manufacturer for the substrate indicated.
10. Locations: Mount on building exterior and interior walls, in locations indicated on Drawings.

2.05 LEED PLAQUES

A. Material: Layered, compacted recycled glass, with applied painted or vinyl applique graphics.
B. Size: 16 inch diameter by 3/4-inch thickness.
C. Mounting: Manufacturer's "Type B" brushed stainless steel mounting that clips the edge of glass with no exposed fastener head
D. Locations: Mount on building exterior or interior walls, in locations indicated on drawings.

2.06 TIME CAPSULE PLAQUES

A. Metal Plaques:
1. Material: Cast Bronze.
2. Edges: generally described as beveled or chamfered with raised border, to be selected from manufacturer's full range of available profiles.
3. Corners: Square, with no border articulation.
4. Background: Stipple texture.
5. Size: 18 inches high by 24 inches wide.
6. Font: To be selected from manufacturer's full range of available fonts.
a. Lettering to include, but not be limited to the following:
1) Date of time capsule enclosure.
2) Intended date of time capsule opening.
b. Verify text with Architect.
7. Finish: Satin bronze letters and borders with dark oxidized background with satin clear coat finish.
8. Mounting: Concealed.
9. Mounting: Exposed fasteners to match finish of surrounding sign area, as recommended by the manufacturer for the substrate indicated.
10. Locations: Mount on building exterior or interior wall, at location indicated on drawings, or if not indicated then in close proximity to time capsule, at location to be selected by Architect.

2.07 ACCESSORIES

A. Fasteners, Anchors, Brackets, and Tape: Type and material recommended by manufacturer for use intended and appropriate for substrate.
B. Pick-proof sealant: As specified in Section 07 92 00 - Joint Sealants.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
B. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.

1. Verify that field measurements, substrates, structural support, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are within tolerances required by the manufacturer, and ready to receive work.

C. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

A. General: Install in accordance with the Drawings, approved submittals, manufacturer's instructions, and as follows:

B. Install neatly, with horizontal edges level.

C. Locate signs where indicated or indicated on Drawings.

1. Securely mount with heavy-duty double stick adhesive tape. Apply pick-proof adhesive sealant to full perimeter of each sign tooled to assure that sealant is flush with edge of sign.

D. Locate plaques and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

3.03 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.

1. Finish touch-up damaged surface finishes.
2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.05 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

B. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 14 19
DIMENSIONAL LETTER SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Dimensional letter signage.
   2. Illumination system.
   3. Hardware and accessories for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA. Americans with Disabilities Act; www.ada.gov.
B. CFR. Code of Federal Regulations; www.ecfr.gov.
C. CDPH. California Department of Public Health; www.cdph.ca.gov.
D. ICC. International Code Council; www.iccsafe.org.
E. NFPA. National Fire Protection Association; www.nfpa.org.
F. UL. Underwriters Laboratories; www.ul.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.
C. ADA Standards - 2010 ADA Standards for Accessible Design.
D. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
E. ICC A117.1 - Accessible and Usable Buildings and Facilities.
F. NFPA 70 - National Electrical Code.
G. UL 879 - Electric Sign Components.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Manufacturer's product literature for each type of dimensional letter sign, indicating style, font, colors, locations, and overall dimensions of each sign.
   2. Shop Drawings:
      a. Include dimensions, locations, elevations, materials, text and graphic layout, and attachment details.
      b. Show locations of electrical service connections.
      c. Include diagrams for power, signal, and control wiring.
   3. Samples: Submit one sample of each type of dimensional letter sign of size similar to that required for project, indicating sign style, font, and method of attachment.
   4. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
   5. Manufacturer's qualification statement.
   6. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project

Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
        2) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.05 MOCK-UPS

A. Provide Mock-ups for each different Signage type indicated by the Drawings, utilizing final specified materials and final production techniques. Install Mock-up in location acceptable to Architect for each type specified.
1. Notify Architect seven days in advance of time when mock-up will be tested and available for review.
2. Modify and/or replace mock-up(s) as many times as are necessary to obtain Architect’s approval.
3. Do not start work of this Section until each mock-up is reviewed and accepted by Owner and Architect.
4. Accepted mock-ups will be a Benchmark Installation used to indicate standard workmanship and pertinent details, and be used to comparatively judge the finished installation. Protect approved mock-up during construction period.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package dimensional letter signs adequately to prevent damage before installation.
B. Store under cover and elevated above grade.

1.07 WARRANTY

A. Manufacturer Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
1. Provide manufacturer's standard warranty for all signage, but not for less than the term specified in the conditions of the contract.

1.08 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
B. Maintain minimum ambient temperature during and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Dimensional Letter Signs: Subject to compliance with these specifications, provide products of one of the following:
1. American Sign Letters: www.americansignletters.com.
2. Architectural Bronze & Aluminum Corp: www.architecturalbronze.com.

3. Gemini Inc; www.geminimade.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.03 DIMENSIONAL LETTERS

A. Applications: Building identification.
   1. Mounting Location: Exterior and Interior as indicated on drawings.
B. Exterior Metal Letters:
   1. Material: Stainless steel sheet, fabricated reverse channel.
   2. Metal Thickness / Return Depth:: 2 inch minimum.
   3. Letter Height: 12 inches.
   4. Text and Typeface:
      a. Character Font: Helvetica, Arial, or other sans serif font, to be selected by Architect from manufacturer's full range.
      b. Character Case: Upper case only.
      c. Lettering shall read: "WILMINGTON ELEMENTARY SCHOOL ".
   5. Finish: As selected by Architect from manufacturer's full range.
   6. Color: As selected by Architect from manufacturer's full range.
   7. Mounting: 1/2 inch projected mounting with threaded stud bosses. Anchor to building using methods suitable to substrate.
   8. Illumination System: Integral LED lit channel letter signage.
      a. Signage shall be provided with indirect, field replaceable, low voltage, LED lighting modules powered from remote power supplies. LED modules shall be equal to GE Tetra miniMax series with 36 lumen output, 3200K color temperature, 150 degree viewing angle, and spaced at 2.5 modules per foot. Remote power supplies shall be equal to GE Tetra GEPS12D series with universal input voltage, Class 2 output(s), 0-10V dimming, and NEMA 1 mounting enclosure.
      b. Signage shall be provided with removable clear Lexan-type polycarbonate resin plastic back panels to support internal LED lighting and prevent ingress of elements and foreign objects which could cause shadowing and shorten life of LED sources.
      c. Signage shall be provided as UL Listed assembly with all electrical sub-components bearing UL Listings.
         1) Provide products that are listed and labeled as complying with UL 879, where applicable.
      d. Power: 120 V, 60 Hz, 1 phase, 15 A.
C. Interior Metal Letters:
   1. Material: Stainless steel sheet.
   2. Thickness/Re: 1 inch minimum.
   3. Letter Height: 12 inch.
   4. Text and Typeface:
      a. Character Font: Helvetica, Arial, or other sans serif font, to be selected by Architect from manufacturer's full range.
      b. Character Case: Upper case only.

c. Lettering shall read: as indicated on drawings.

5. Finish: As selected by Architect from manufacturer's full range.
6. Color: As selected by Architect from manufacturer's full range.
7. Mounting: 1/2 inch projected mounting with threaded stud bosses. Anchor to wall using methods suitable to substrate.
8. Location: As indicated on drawings

2.04 ACCESSORIES

A. Fasteners, Anchors, Brackets, and Tape: Type and material recommended by manufacturer for use intended and appropriate for substrate.

B. Electrical Components and Devices: Listed and labeled as defined in NFPA 70 by a qualified testing agency.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:

B. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.

1. Verify that field measurements, substrates, structural support, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are within tolerances required by the manufacturer, and ready to receive work.

C. Verify that electrical service is correctly sized and located to accommodate dimensional letter signs.

D. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install Signage according to the Drawings, approved submittals, manufacturer's instructions, and as follows:

1. Install neatly, with horizontal edges level.
2. Locate signs where indicated or indicated on Drawings.
3. Locate dimensional letter signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

3.03 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.

1. Finish touch-up damaged surface finishes.
2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.05 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 10 14 23
GENERAL SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Barrier-free compliant room and door signs for interior and exterior locations.
   2. Panel signage.
   3. Emergency evacuation map holders.
   4. Vinyl adhesive signage for concealed spaces.
   5. Vinyl adhesive markers to be applied to ceilings to mark locations of concealed valves.
   6. Vinyl applique text for exterior windows, doors, curtain walls, and storefront, per requirements of local fire authorities.
   7. Resin panel signage.
   8. Large-format vinyl applique emblems.
   9. Elevator call button signage.
   10. Elevator machine room signage.
   11. Miscellaneous signage and certificates required by building codes and local Authority Having Jurisdiction (AHJ).
   12. Accessories and hardware for complete installation.

B. See Section _____ for LEED-related exterior non-smoking signage.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA. Americans with Disabilities Act; www.ada.gov.

B. ANSI. American National Standards Institute: www.ansi.org.

C. CDPH. California Department of Public Health; www.cdph.ca.gov.

D. ICC. International Code Council; www.iccsafe.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Manufacturer's product literature for each type of panel sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.
   2. Shop Drawings:
      a. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
      b. Schedule: Provide information sufficient to completely define each panel sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
         1) When room numbers are to appear on signs differ from those on drawings, include the drawing room number on schedule.

2) When content of signs is indicated to be determined later, request such information from Owner, through Architect, at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
3) Submit for acceptance by Owner through Architect prior to fabrication.

3. Samples: Submit two samples of each type of sign, of size similar to that required for project, indicating sign materials, style, layout, font, and method of attachment.
4. Selection Samples: Where colors, materials, and finishes are not specified, submit two sets of color selection charts or chips.
5. Verification Samples: Submit samples showing colors, materials, and finishes specified.
6. Verification Drafts: Provide paper drafts of every room and door sign, including all lettering, braille, and pictograms, for review by Owner and Architect.
7. Specimen warranty.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
a. Include documentation of:
1) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals
1. Submit in accordance with the following:
a. Section 01 70 00 - Execution and Closeout Requirements.
b. Section 01 78 00 - Closeout Submittals.
2. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.05 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for general requirements for in-place mock-ups.
B. Provide mock-ups for each different signage type indicated on drawings, utilizing final specified materials and final production techniques. Install mock-up in location acceptable to Architect for each type specified.
1. Notify Architect seven days in advance of time when mock-up will be tested and available for review.
2. Modify and/or replace mock-up(s) as many times as are necessary to obtain Architect’s acceptance.
3. Do not start work of this section until each mock-up is reviewed and accepted by Owner and Architect.
4. Accepted mock-ups will be a benchmark installation used to indicate standard workmanship and pertinent details, and be used to comparatively judge the finished installation. Protect approved mock-up during construction period.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package signs adequately to prevent damage before installation.
B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store under cover and elevated above grade.
D. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
B. Maintain minimum ambient temperature during and after installation.

1.08 WARRANTY

A. Manufacturer Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
    1. Provide manufacturer's standard warranty for all signage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Panel Signage: Subject to compliance with these specifications, provide products of one of the following:
    1. Architectural Signs and Engraving; Blast Etch Melamine Series BE-100: www.asesigns.com. (Basis of Design)
    2. Best Sign Systems, Inc; Graphic Blast MP series: www.bestsigns.com.
    3. Mohawk Sign Systems, Inc; Sand-carved series 200-A: www.mohawksign.com.
    4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
B. Signage for Concealed Spaces: Subject to compliance with these specifications, provide products of one of the following:
    1. Fire Wall Signs, Inc.; firewallsigns.com.
    2. My Safety Sign; mysafetysign.com.
    3. Safety Supply Warehouse; www.safetysupplywarehouse.com.
    4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
C. Vinyl Applique Signage: Subject to compliance with these specifications, provide products of one of the following:
    1. 3M Company; product Scotchlite Reflective Graphic Film 5100 Series: www.solutions.3m.com.
    2. Avery Dennison Company: Product Series HV1200 beaded sheeting: www.graphics.averydennison.com.
    3. Gerber Scientific Products; product Series 280 reflective vinyl film: www.gspinc.com.
    4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
D. Resin Panel Signage: Subject to compliance with these specifications, provide products of one of the following:
    1. 3-form; Varia Eco Resin; www.3-form.com. (Basis of Design)
    2. Lumicor; Decor Collection; to be selected by Architect from standard patterns: www.lumicor.com.
    3. Premium Panels - Luxface Collection; Luxform, to be selected by Architect from standard patterns; www.premium-panels.com.

4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with ADA Standards for Accessible Design and ANSI/ ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

B. Barrier Free Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including doors leading to corridors, lobbies, and similar open areas, and vestibules.

2.03 PANEL SIGNAGE

A. Panel Signage:

1. Application: Barrier Free room and door signs.
2. Description: Flat signs with blast-etched media, tactile characters.
3. Sign Size: As indicated on drawings.
4. Sign Mounting Height: As indicated on drawings.
5. Total Thickness: 1/4 inch.
6. Sign Edges: Squared.
7. Corners: Squared.
8. Color and Font, unless otherwise indicated:
    a. Character Font: Helvetica, Arial, or other sans serif font.
    b. Character Case: Upper and lower case (title case).
    c. Background Color: As scheduled.
    d. Character Color: Contrasting color.
9. Provide "tactile" signage, with letters raised minimum 1/32 inch. Raised characters are to be negatively engraved. Glued on characters are not acceptable.
10. Braille: Grade II, ADA-compliant.
11. Letter and numbers on signs shall have width to height ratio between 3:5 and 1:1, and stroke width to height ratio of between 1:5 and 1:10, and conform to Massachusetts. AAB. and ADAAG requirements. Letters shall be minimum 5/8 inch tall, but not more than 2 inch tall.
12. Provide pictograms for signs including but not limited to toilet rooms and stairs, as indicated on drawings, with equivalent language directly below.
13. Room Names and Numbers: Will be confirmed by Owner at a later date. Room names and numbers used in Construction Documents may change. Schedule of room numbers to be confirmed during shop drawing review.
14. Where signage is shown or required by code to be mounted to glass panels, provide matching blank sign panel at opposite side of glass. Use tape adhesive only for installation of sign panels to glass.
15. Where panel signs are shown or required by code for exterior locations, provide sign product indicated by manufacturer as UV- and weather-resistant and intended for exterior use.
16. Mounting: Tape adhesive, with pick-proof silicone adhesive sealant to fill voids at perimeter of sign panel provided by signage installer.
    a. Color of sealant to approximate color of wall.

2.04 PANEL SIGNAGE APPLICATIONS

A. Barrier Free Room and Door Signs: Applications include but are not limited to:

1. Office Doors: Identify with room names and numbers to be determined later, not those indicated on drawings; provide "window" section for replaceable occupant name, and braille.

2. Conference and Meeting Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings; provide "window" section with sliding "In Use/Vacant" indicator, and braille.
3. Assembly space: Identify as indicated on drawings. Include braille.
4. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings, and braille
5. Restrooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.

B. Interior Directional and Informational Panel Signs:
1. Directories: For customer-produced media; provide divider strips.
2. Where suspended, ceiling mounted, or projecting from wall signs are indicated, provide two-sided signs with same information on both sides.

2.05 EMERGENCY EVACUATION MAP HOLDERS

A. Provide one map per elevator lobby, one in every room with access to the corridor, with the exception of custodial or utility rooms, and as indicated in drawings.
B. Electronic graphics files of evacuation plans will be furnished by Owner to Construction Manager for printing and installation in frames.
C. Mount at locations and heights indicated on drawings.
D. Provide clear protective panel of polycarbonate plastic, glossy on back, non-glare on front, with ull-color graphic, mounted to opaque media behind, in brushed aluminum frame, screw-mounted.
1. Provide tamper-resistant, concealed mounting hardware.
E. Minimum size: To accommodate 8-1/2 inches by 11 inches media.

2.06 VINYL ADHESIVE SIGNAGE FOR CONCEALED SPACES

A. Material: Vinyl, with adhesive-backed construction.
B. Mounting: Peel and stick application, of type appropriate for substrate.
C. Locations: Concealed floor spaces, floor-ceiling spaces, attic spaces, fire walls, fire barriers, fire partitions, smoke barriers, and smoke partitions, and other walls requirement to have protected openings or penetrations shall be effectively and permanently identified with signs.
1. Signs are required only where fire or smoke partitions are concealed. Rooms with exposed ceilings do not require these signs.
2. Painted stenciling is acceptable in lieu of vinyl adhesive signage for concealed spaces.
D. Lettering: not less than 3 inches in height, with minimum 3/8 inch stroke in a contrasting color, incorporating the suggested wording "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS".

2.07 VINYL ADHESIVE MARKERS FOR CONCEALED VALVES

A. Material: Vinyl, with adhesive-backed construction.
B. Mounting: Peel and stick application, of type appropriate for substrate.
C. Locations:
1. Adhesive markers shall be applied to ceilings, to mark locations of concealed valves.

2.08 VINYL APPLIQUE TEXT

A. High performance vinyl graphics with self-adhesive backing, intended for interior and exterior use.
1. Font: Arial or Helvetica, if not otherwise indicated on drawings.
2. Vinyl graphics at exterior glazing shall be located as indicated on drawings and specified herein.

a. One number shall be applied to each inside and outside face of all exterior doors. Exception: At double doors or a bank of doors, apply to one leaf (both sides).
b. Exact locations shall be coordinated with Architect prior to installation.
c. Numbering system shall be coordinated with local Fire Department and Fire Protection Trade Contractor for their use in keying numbers to the fire alarm control panel.

3. Size: 6 inch high letters and numbers.
4. Color to be selected by Architect from manufacturer's full range.

B. Install neatly, with horizontal edges level, and in accordance with manufacturer's written instructions.

2.09 LARGE-FORMAT VINYL APPLIQUE EMBLEMS

A. High performance large-format vinyl applique wall emblem, with self-adhesive backing.
B. One large format circular wall emblem of approximately 8 feet in diameter.
C. See drawings for location.
D. Design, size, and location shall be coordinated with Ownerand Architect prior to ordering of emblem and installation.

2.10 RESIN PANEL SIGNAGE

A. Provide resin panel signage with custom-printed digital interlayer, at locations indicated on drawings.
1. Panel thickness: 1/2 inch.
2. Panel size: As indicated on drawings.
3. Material co-polyester resin.
4. See drawings for text.
5. Color to be selected by Architect from manufacturer's full range of standard colors.
6. Finish: Front and back finish shall be Sandstone or equal.
7. Digital print interlayer shall be printed on clear film and backed with Avalanche or equal opaque paper.
a. Owner will provide electronic graphics for each sign location.
8. Point Supports: 1/4 inch milled stainless steel barrel type, compliant with manufacturer recommendations.

2.11 ELEVATOR CALL BUTTON SIGNAGE

A. Provide wall mounted advisory signage at every elevator hall button station.
1. Minimum size shall be 3-1/4 inches by 2-1/4 inches.
2. The lettering shall be raised on a contrasting background, and shall read and be sized as follows:

IN CASE OF
FIRE
IN THIS BUILDING
USE EXIT STAIRWAYS
DO NOT USE THIS ELEVATOR

3. "In Case of" 1/8 inch text height or 14 point lettering Color: Black.
4. "Fire" shall be 3/8 inch text height or 30 point lettering Color: Red.
5. "In This Building" shall be 1/8 inch or 14 point lettering Color: Black.
6. "Use Exit Stairways" shall be 3/16 inch text height or 16 point lettering Color: Red.
7. "Do Not Use This Elevator" shall be 1/8 inch text height or 14 point lettering Color: Black.

2.12 ELEVATOR MACHINE ROOM SIGNAGE

A. Elevator Machine Room: sign complying with applicable building codes.

B. Sign shall read "ELEVATOR MACHINE ROOM - NO STORAGE ALLOWED" and on separate line "DANGER - ACCESS ONLY ALLOWED WHEN ACCOMPANIED BY A MASSACHUSETTS-LICENSED ELEVATOR MECHANIC".

2.13 ACCESSORIES

A. Fasteners, Anchors, Brackets, and Tape: Type and material recommended by manufacturer for use intended and appropriate for substrate.

B. Pick-proof security sealant: As specified in Section 07 92 00 - Joint Sealants.

C. Where certificates are required by code or by the AHJ, or indicated in the documents to be posted, provide clear plastic panel w/ opaque media behind, in brushed aluminum frame, screw-mounted, minimum size: 8-1/2 inch by 11 inch media.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions:
   1. Comply with requirements of Section 01 40 00 - Quality Requirements.
   2. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, substrates, structural support, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are within tolerances required by the manufacturer, and ready to receive work.

B. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

A. General: Install Signage according to the Drawings, approved submittals, manufacturer's instructions, and as follows:
   1. Install neatly, with horizontal edges level.
   2. Locate signs where indicated or indicated on drawings.
      a. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches above finished floor in accordance with state accessibility rules and ADA requirements.
         1) Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be mounted on the nearest adjacent wall. Where sidelights exist at latch side of door, install signage to the glass using adhesives tapes or sealants as recommended by manufacturer, and provide and install blank plates of same size, material, and background color as the signs at the opposite side of the glass in alignment with the sign.
      b. Securely mount with heavy-duty double stick adhesive tape.
      c. Apply pick-proof sealant to full perimeter of each sign tooled to assure that sealant is flush with edge of sign.

B. Locate panel signs and mount at heights indicated on drawings and in accordance with ADA Standards and ANSI / ICC A117.1.

C. Protect from damage until project completion; repair or replace damaged items.

3.03 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Finish touch-up damaged surface finishes.
   2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.05 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 10 21 13.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and erecting the following:
   1. Solid plastic toilet compartments.
   2. Privacy screens.
   3. Entry partitions.
   4. Urinal screens.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.
B. CDPH. California Department of Public Health; www.cdph.ca.gov.
C. NFPA. National Fire Protection Association; www.nfpa.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
D. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Shop Drawings: Indicate partition plan, elevation views, dimensioned layout, elevations, details of wall supports, door swings, trim, closures, fasteners, and accessories.
   2. Product Data: Provide data on panel construction, hardware, and accessories.
   3. Samples: Submit two samples of partition panels, 6 by 6 inch in size illustrating panel finish, color, and sheen.
   4. Speciment warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.

2. Operation and Maintenance Data: Methods for maintaining partitions, precautions regarding cleaning materials and methods. List of all components with part numbers, sources of supply, and operation and maintenance instructions.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
   a. See Section 01 60 00 - Product Requirements for additional provisions.
   b. Extra materials: Provide five extra panels of each size provided in the project.
4. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Minimum five years of experience in work of this Section.
B. Single Source Requirement: Provide all toilet compartments and urinal screens from the same manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with plastic toilet compartment manufacturer's instructions and recommendations, Section 01 60 00 - Product Requirements, and the following:
   1. Protect plastic toilet compartments during shipment, storage, and handling. Deliver in factory packaging; do not open packaging until units are needed for installation.
   2. Store units flat, in dry, well-ventilated space, off the ground, and under cover; do not stand on end. Do not lean metal toilet compartments.
   3. Protect edges from damage.
   4. Do not store plastic toilet compartments in locations where they will be exposed to direct sunlight or high heat.

1.08 WARRANTIES

A. Provide manufacturer’s warranty of not less than 15 years against breakage, corrosion, and delamination under normal conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments: Subject to compliance with these specifications, provide products of one of the following:
   1. Hadrian; Hadrian - Standard Series - Plastic: www.hadrian-inc.com.
   2. Partition Systems International of South Carolina; PolyLife HDPE Toilet Partitions : www.psisc.com.
   3. Scranton Products; Hiny Hiders Partitions: www.scrantonproducts.com. (Basis of Design)
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), forming single thickness panel, tested in accordance with NFPA 286; floor-mounted headrail-braced.
   1. Panels to be waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
   2. Recycled content: minimum 25 percent.
   3. Fire hazard classification: Pass NFPA 286.
   4. Color: To be selected by Architect from manufacturer's full color range. Architect may select multiple colors per room.
B. Doors:

1. Thickness: 1 inch, with edges rounded to 1/4-inch radius.
2. Width: As indicated on Drawings.
3. Width for Handicapped Use: As indicated on drawings, but providing not less than 32 inches clear width, out-swinging.
4. Height, and mounting height above floor: As indicated on Drawings. Comply with applicable accessibility standard's requirements to meet or exceed minimum dimensions of stall, related to height of toe clearance.

C. Panels:
1. Thickness: 1 inch.
2. Height: As indicated on Drawings.

D. Pilasters:
1. Thickness: 1 inch.
2. Width: To fit space; minimum 3 inches at wall terminations, minimum 5 inches between compartments.
3. Height: As indicated on drawings.

E. Privacy screens and entry partitions: Without doors; to match compartments; mounted to wall with two panel brackets.

F. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

G. Stainless Steel: Type 304.

2.03 ACCESSORIES

A. Pilaster Sleeves: Formed 20 gage stainless steel, 3 inches high; secured to pilaster with stainless steel tamper resistant Torx head sex bolt.

B. Head Rails: Heavy duty extruded hollow anodized aluminum,1 inch by 1-1/2 inch size, with anti-grip profile and cast socket wall brackets, fastened to headrail with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.

C. Pilaster Brackets: 20 gage stainless steel, satin finish; secured to wall with stainless steel tamper resistant Torx head screws.

D. Wall Brackets: Continuous type, polished stainless steel, fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.

E. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.

F. Hinges:
1. 8 inches long, fabricated from heavy-duty extruded aluminum with bright dip anodized finish, wrap-around flanges, adjustable on 30-degree increments, through bolted to doors and pilasters with stainless steel, Torx head sex bolts.
2. Hinges operate on field-adjustable nylon cams, field adjustable in 30 degree increments.

G. Door Hardware: Stainless steel, manufacturer's standard finish.
1. Door Latch: Slide type.
a. Heavy-duty extruded aluminum.
b. Latch housing: Bright dip anodized finish.
c. Slide latch and paddle.
2. Door Strike and Keeper with Soft Bumper or Neoprene Bumper: Mount on pilaster in alignment with door latch.
a. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap-around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.
3. Provide door pull for outswinging doors.

a. Chrome plated Zamak.
b. Provide door pulls on interior and exterior faces of all barrier free and ambulatory stall doors, and corresponding door stops.
c. Provide one door pull for each standard stall door, and two door pulls at each barrier free and ambulatory stall door.

4. Coat Hook with Rubber Bumper: One per compartment, mounted on door.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify correct spacing of and between plumbing fixtures.
C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install compartments in accordance with manufacturer's instructions and approved Shop Drawings.
B. Install partitions secure, straight, rigid, plumb, and level .
C. Locate bottom edge of doors and panels at distance above floor as indicated on Drawings.
D. Maintain uniform, maximum 3/8 inch space between wall and panels and between wall and end pilasters.
E. Attach panel brackets securely to walls using anchor devices.
F. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
G. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.
H. Not Acceptable: Evidence of cutting, drilling, or patching.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch.
B. Maximum Variation From Plumb: 1/8 inch.
C. Maximum out-of-plane or panel warp: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
C. Adjust adjacent components for consistency of line or plane.
D. Adjust latches to operate correctly.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 10 21 23
CUBICLE CURTAINS AND TRACK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following cubical curtain system work:
   1. Surface mounted overhead curtain track and guides.
   2. Cubicle curtains.

B. Accessories required for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. MGL. Masschusetts General Law; www.malegislature.gov.

B. NFPA. national Fire Protection Association; www.nfpa.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. MGL, Part 1, Title II, Chapter 21A, Section 28 - Protection from Harmful Flame Retardants.

C. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide data for curtain fabric characteristics.
   2. Shop Drawings: Indicate a reflected ceiling plan view of curtain track, hangers and suspension points, attachment details, schedule of curtain sizes.
   3. Samples: Submit three fabric samples, 12 by 12 inch in size illustrating fabric color.
   4. Samples: Submit 12 by 12 inch sample patch of curtain cloth with representative top, bottom, and edge hem stitch detail, heading with reinforcement and carrier attachment to curtain header.
   5. Samples: Submit 12 inch sample length of curtain track including typical splice, wall and ceiling hanger, and escutcheon.
   6. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.

D. Closeout Submittals:
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.

2. Maintenance Data: Include recommended cleaning methods and materials and stain removal methods.
3. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.
4. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    a. Extra Curtains: Two of each type, color, patt and size.
    b. Extra Carriers: Ten.

1.05 QUALITY ASSURANCE

A. Protection From Harmful Flame Retardants:
    1. Products shall comply with MGL, Part 1, Title II, Chapter 21A, Section 28.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 - Product Requirements, and as follows:
    1. Accept curtain materials on site and inspect for damage.
    2. Store curtain materials on site and deliver to Owner for installation when requested.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements of these Specifications, provide equivalent products from one of the following:
    1. Cubicle Track and Curtains:
        a. A. R. Nelson Co; 1200 CT Track System: www.arnelson.com.
        b. Construction Specialties, Inc; Track Systems: www.c-sgroup.com. (Basis of Design)
        c. Imperial Fastener Co., Inc; IFC-98 Track System: www.imperialfastener.com.
        d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 TRACKS AND TRACK COMPONENTS

A. Tracks: Extruded aluminum sections; one piece per track run.
    1. Profile: Channel.
    2. Mounting: Surface.
    3. Structural Performance: Capable of supporting vertical test load of 50 lbs without visible deflection of track or damage to supports, safely supporting moving loads, and sufficiently rigid to resist visible deflection and without permanent set.
    4. Track End Stop: To fit track section.
        a. Provide accessories to assure a complete installation.
    5. Track Bends: Minimum 12 inch radius; fabricated without deformation of track section or impeding movement of carriers.
    6. Suspension Rods: Tubular aluminum sections, sized to support design loads and designed to receive attachment from track and ceiling support.
    7. Escutcheons: Where suspension rod meets finished ceiling or structure, provide escutcheons to match rod finish.
    8. Finish on Exposed Surfaces: Clear anodized.
B. Curtain Carriers: Nylon rollers, size and type compatible with track; designed to eliminate bind when curtain is pulled; fitted to curtain to prevent accidental curtain removal.
    1. Provide one carrier for each six inches of fabric width
C. Wand: Plastic, attached to lead carrier, for pull-to-close action.

D. Installation Accessories: Types required for specified mounting method and substrate conditions.

2.03 CURTAINS

A. Cubicle Curtains:
   1. Inherently flame resistant or flameproofed; capable of passing NFPA 701 test.
   2. Material: Close weave polyester; anti-bacterial, self deodorizing, sanitized, and preshrunk.

B. Curtain: 100 percent F/R Trevira Polyester, or an Architect acceptable equivalent.
   1. Color as selected by Architect from manufacturer's full range of standard and premium colors and fabrics.

C. Products: Subject to compliance with these Specifications, provide equivalent products from one of the following:
   1. Maharam/ Immerse; http://maharam.com/. (Basis of Design)
   2. Designtex/ Continuum; http://www.designtex.com/.
   3. Knoll/ Fission Chips in Blue Nile; http://www.knoll.com/knolltextileproductdetail/Fission+Chips.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas, for compliance with requirements affecting work performance.
      a. Verify that field measurements, surfaces, structural supports above ceiling, tolerances, levelness, plumbness, cleanliness and other conditions are within acceptable tolerances required by the manufacturer, and ready to receive work.
      b. Proceed with installation only after unsatisfactory conditions have been corrected.
      c. Coordinate with other trades to assure that placement of all ceiling mounted devices are clear of track path, including but not limited to sprinklers, diffusers, grilles, recessed lighting, speakers, and other similar devices and equipment.

3.02 INSTALLATION

A. General: Install cubical curtain track system according to the Drawings, submittals, manufacturer's instructions, and as follows:
   1. Defer installation of curtains until final cleaning is done, and just before Substantial Completion.
   2. Install curtain track to be secure, rigid, and true to ceiling line.
   3. Do not install curtain track immediately below diffusers, grilles, or recessed lighting fixtures.
   4. Secure track to reinforced supports above ceiling system - securing to ceiling tees alone is not acceptable.
   5. Install curtains on carriers ensuring smooth operation.

3.03 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.04 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 10 22 13
WIRE MESH PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Designing, fabricating, delivering, erecting, and installing the following work as indicated in the drawings and specified herein:
   1. Wire mesh systems for walls, ceilings, and stairways.
   2. Access door and gates in partitition systems.
   3. Accessories needed for a complete installation, including anchors, fasteners, and gate hardware.

1.02 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
   1. ASTM. ASTM International; www.astm.org.
      a. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
      b. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
      c. ASTM E1190 - Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.
      d. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements.
   2. AWS: American Welding Society: www.aws.org.
      a. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.
      b. AWS D1.1/D1.1M - Structural Welding Code - Steel.
   3. SSPC. Society for Protective Coatings; www.sspec.org.
      a. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
      b. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Shop Drawings: Indicate plan and vertical dimensions, elevations, component details; head, jamb, and sill details; location of hardware. Provide component details, anchorage, and type and location of fasteners.
      a. Show field measurements on shop drawings.
   2. Samples: Submit three samples of infill with frame, 12 by 12 inch in size, illustrating screen material. Submit samples of hinge and latchset illustrating style, color, and finish. Incorporate sample into the work.
   3. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Operation and Maintenance Data: Methods for maintaining partitions, precautions regarding cleaning materials and methods.
   3. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wire Mesh Partitions:
   1. Acorn Wire and Iron Works, Inc: www.acornwire.com.
   2. The G-S Company: www.g-sco.com.
   3. Miller Wire Works, Inc: www.millerwireworks.com.
   4. Other manufacturer’s products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: See Section 01 25 00 - Substitution Procedures.

2.02 WIRE MESH PARTITIONS

A. Wire Mesh Partitions: Factory-fabricated modular assemblies of panels, doors, anchors, hardware, and accessories to provide a complete system.
   1. Performance:
      a. Installed Wall Assembly: Resist a lateral load of 500 lbs without damage or permanent set.
      b. Hinged Door and Panel in Open Position: Resist a downward load of 300 lbs without damage or permanent set.

2.03 COMPONENTS

A. Framing and Support Members:
   1. Material: ASTM A36/A36M steel shapes and ASTM A500/A500M cold-formed steel tubing.
   2. Frames: 1-1/2 inches by 3/4 inch by 11 gage channels with slotted holes for 3/8-inch bolts at 18 inches O.C.
   3. Reinforcing Members: two 1-1/4 inch by 5/8 inch by 13 gage "C" channels riveted toe to toe through mesh and welded to vertical frames.
   4. Cap Rail: 3 inches 4.1# channel with 1/4 inch "U" bolts 2 feet-4 inches O.C.
   5. Corner and Intersecting Posts:
      a. 1-1/2 inches by 1-1/2 inches by 1/8 inch angle for 90 degree corners,
      b. 1-1/2 inches pipe posts for other than 90 degrees,
      c. 2 inches by 2 inches tubes for 3 and 4 way intersections.
   6. Flatbar Posts: For all partitions.
      a. 1/4 inch by 2 inches for partitions up to 16 feet-0 inch high.
      b. 5/16 inch by 2-1/2 inches for partitions 16 feet-0 inch to 18 feet-0 inch high.
      c. 5/16 inch by 3 inches for partitions 18 feet-0 inch to 20 feet-0 inch high.

7. Line Post: Free standing partitions have 3 inches by 4.1 # channel line posts at 20 feet maximum on center, with 5 inches by 18-inches by 5/16-inch base plates.
8. Vertical Stiffeners: Manufacturer's recommended stiffeners for partitions greater than 144 inches in height.

B. Doors: Same material as partitions, fully framed; manufacturer's standard construction and hardware for swing operation.
1. Hinged Door Frames: 1-1/2 inches by 3/4 inch by 11 gage channel with 1/8 inch by 1-1/2 inches flat bar band on four sides, and as slam bar welded to lock side. Each door to have 1-1/2 pairs butt hinges welded to both door and transom bar, and gate box for installation of mortise type cylinder lock by others. Outside by key, inside by recessed turn.
2. Door Jamb Framing: 2-by-2-by-1/8-inch (50-by-50-by-3-mm) steel pipe or tubing.

C. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

2.04 FASTENERS

A. Bolts, Nuts and Washers: Hot dip galvanized.

B. Anchorage Devices: Provide power driven, powder actuated, and drilled expansion bolts.

C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, unobtrusively located, consistent with design of structure.

D. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts.

E. Expansion Anchors in Concrete and Masonry: With capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E488/E488M, conducted by a qualified independent testing agency.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated and fabricated from corrosion-resistant materials; with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by wire mesh construction, as determined by testing per ASTM E1190, conducted by a qualified testing and inspecting agency.

2.05 ACCESSORIES

A. Bracing: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

C. Post Caps: Manufacturer's standard.

D. Floor and Ceiling Pilaster Shoe: Manufacturer's standard.

E. Floor Base: Manufacturer's standard.

2.06 FINISHES

A. Shop and Touch-Up Primer:
1. Ferrous Surfaces: SSPC-Paint 15, complying with VOC limitations of Authorities Having Jurisdiction and project's sustainability requirements.
2. Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of Authorities Having Jurisdiction and project's sustainability requirements.

B. Painted Finish: Manufacturer's standard powder coat finish.
1. Color: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that substrate surfaces and required openings are ready to receive work.

3.02 PREPARATION

A. Clean substrate surfaces.

B. Clean partition surfaces of rust, scale, grease, and foreign matter prior to field finishing as specified in Section 09 91 23.

3.03 INSTALLATION

A. Coordinate work with door hardware subcontractor, to achieve code-compliant egress function on gates.

B. Install in accordance with manufacturer's instructions.

C. Install items plumb and level, accurately fitted, free from distortion or defects.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. After installation, touch-up field welds scratched or damaged surfaces with shop applied finish.

3.04 TOLERANCES

A. Maximum Variation From Plumb or Level: 1/4 inch.

B. Maximum Misalignment From True Position: 1/4 inch.

3.05 ADJUSTING

A. Adjust doors to achieve free movement.

3.06 CLEANING

A. Remove temporary protection to prefinished surfaces.

END OF SECTION

SECTION 10 22 39
FOLDING PANEL PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing, delivering, erecting, and installing folding partitions including the following work:
   1. Top-supported folding panel partitions, horizontal opening.
   2. Ceiling track, ceiling guards, and operating hardware.
   3. All accessories required for a full and complete folding partition system.

B. Work being provided by other sections includes the following:
   1. Pre-punching of the support structure in accordance with shop drawings shall be by the structural steel subcontractor.
   2. Blocking at walls shall be furnished and installed by the Construction Manager / Sections 06 10 00 - Rough Carpentry and 09 21 16 - Gypsum Board Assemblies.

1.02 ABBREVIATION AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.

B. MGL. Massachusetts General Law; www.malegislature.gov.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

D. ASTM E413 - Classification for Rating Sound Insulation.

E. ASTM E557 - Standard Guide for Architectural Design and Installation Practices for Sound Isolation Between Spaces Separated by Operable Partitions.

F. MGL, Part 1, Title II, Chapter 21A, Section 28 - Protection from Harmful Flame Retardants.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals:
   1. Product Data: Provide data on partition materials, operation, hardware and accessories, electric operating components, track switching components, and colors and finishes available.
   2. Shop Drawings: Indicate opening sizes, track layout, details of track and required supports, static and dynamic loads, location and details of pass door and frame, adjacent construction and finish trim, and stacking depth.
   3. Samples for Selection: Submit three samples of full manufacturer's color range for selection of colors.
   4. Samples for Verification: Submit three samples of surface finish, 6 by 6 inches size, illustrating quality, colors selected, texture, and weight.
   5. Field Report: Independent acoustical consultant's Noise Isolation Class (NIC) testing field reports.

C. Sustainability Submittals:
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional

prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals:
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   3. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods. Describe cleaning materials detrimental to finish surfaces and hardware finish.

1.05 QUALITY ASSURANCE

A. Protection From Harmful Flame Retardants:
   1. Products shall comply with MGL, Part 1, Title II, Chapter 21A, Section 28.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 WARRANTY

A. Manufacturer / Special Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
   1. Provide manufacturer’s standard two year material and workmanship warranty, issued upon completion of the work and beginning on the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Folding Panel Partitions - Horizontal Opening:
   1. Moderco, Inc; 800 Series Model 841: www.moderco.com.
   2. Modernfold, a DORMA Group Company; Acousti-Seal Encore: www.modernfold.com. (Basis of Design)
   3. Panelfold; Model 810PP: www.panelfold.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 FOLDING PANEL PARTITIONS - HORIZONTAL OPENING

A. Folding Panel Partitions: Side opening; paired panels; center stacking; manually operated.

B. Panel Construction:
   1. Core: 16 gage, 0.0598 inch thick formed sheet steel frame top, bottom, jambs, and intermediates; welded construction, with acoustical insulation fill.
   2. Panel Substrate Facing: Steel sheet, the thicker of: manufacturer's standard thickness, or thick required to achieve specified STC rating.
   3. Hinges: Full leaf butt type, ___ gauge, _____ inch, stainless steel.
   4. Provide pass doors where shown on Drawings. Same design and construction as panel; fit door with perimeter acoustic gaskets. Doors must be ADAA and MAAB compliant.
   5. Panel Properties:
      a. Thickness With Finish: 3 inches.

C. Panel Finishes:
   1. Factory-applied surface finishes.

2. Facing: Impact-resistant plastic laminate / phenolic panels with fully tackable surface. Color, pattern, and texture, to be selected from manufacturer's full range of standard and non-standard finishes.
3. Trim: Aluminum.

D. Panel Seals:
1. Panel to Panel Seals: Grooved and gasketed astragals, with continuous flexible ribbed vinyl seal fitted to panel edge construction; color to match panel finish.
2. Acoustic Seals: Flexible acoustic seals at jambs, meeting mullions, ceilings, retractable floor and ceiling seals, and above track to structure acoustic seal.

E. Suspension System:
1. Track: Formed steel; 1-1/4 by 1-1/4 inch size; thickness and profile designed to support loads, steel sub-channel and track connectors.
a. Track design shall include ceiling finish trim.
b. Track shall be connected to the structural support by pairs of minimum 3/8-inch diameter threaded steel rods and spaced in order to meet the loading requirements.
2. Carriers: Steel, ball bearing wheels on trolley carrier at top of every panel, sized to carry imposed loads, with threaded pendant bolt for vertical adjustment.

F. Performance:
1. Acoustic Performance:
a. Sound Transmission Class (STC): minimum 50 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90, on panel size of 100 sq ft.
b. Noise Isolation Class (NIC): rating of 55, minimum.
2. Surface Burning Characteristics of Panel Finish: Class A, when tested in accordance with ASTM E84.
3. Installed partition system track capable of supporting imposed loads, with maximum deflection of 1/360 of span.

G. Accessories:
1. Acoustic Sealant: As recommended by partition manufacturer.

2.03 MATERIALS

A. Acoustic Insulation: Type and thickness required to achieve indicated acoustic performance.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify track supports are laterally braced and will permit track to be level within 1/4 inch of required position and parallel to the floor surface.
C. Verify floor flatness of 1/8 inch in 10 feet, non-cumulative.
D. Verify wall plumbness of 1/8 inch in 10 feet, non-cumulative.
E. Delay installation of panels until major construction in the space including painting is complete.

3.02 INSTALLATION

A. General: The complete installation of the folding panel partition shall be by an authorized factory-trained installer and be in strict accordance with shop drawings.
1. Install partition in accordance with manufacturer's instructions and ASTM E557.
2. Drill and tap to meet project requirements and securely anchor track and accessories in accurate location.
3. Install track in lengths as long as practicable with flush hairline joints.
4. Lubricate moving components.

5. Install acoustic sealant to achieve required acoustic performance.
6. Coordinate electrical connections.

3.03 ADJUSTING

A. Adjust partition assembly to provide smooth operation from stacked to full open position. Do not over-compress acoustic seals.

B. Visually inspect partition in full extended position for light leaks to identify a potential acoustical leak.

C. Adjust partition assembly to achieve lightproof seal.

D. Field testing:

1. Contractor shall provide field test reports from an independent acoustical consultant. If testing does not achieve an NIC value of at least 55, contractor shall repair or replace those folding panel partition(s) that fail this testing, at contractor's expense, and provide field test reports from an independent acoustical consultant documenting minimum NIC values of 55.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean finish surfaces and partition accessories.

3.05 CLOSEOUT ACTIVITIES

A. Demonstration and training in accordance with Section 01 79 00 - Demonstration and Training.

1. Demonstrate operation of partition and identify potential operational problems.

B. Operating keys shall be provided to Owner's representative.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 10 26 00
WALL PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, and delivering the following work, for installation by Section 06 20 00 - Finish Carpentry:
   1. Corner guards.
   2. Accessories required for complete installation, including but not limited to fasteners and anchors.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA. Americans with Disabilities Act; www.ada.gov.
B. CDPH. California Department of Public Health; cdph.ca.gov.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ADA Standards - 2010 ADA Standards for Accessible Design.
C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Indicate physical dimensions, features, anchorage details, rough-in measurements, and required blocking.
   2. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
      a. Submit two sections of corner guards, 24 inches long, illustrating component design, configuration, color and finish.
      b. Color samples for initial selection: One set of manufacturer's full range of standard and non-standard colors.
   3. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.
         2) VOC content and CAL (CDPH SM). Emissions testing compliance of adhesives and sealants.
D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.

2. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
   a. See Section 01 60 00 - Product Requirements, for additional provisions.
   b. Extra Stock Materials: One of each type and size of corner guard.
4. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, and Section 01 60 00 - Product Requirements.
B. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.
C. Protect work from moisture damage.
D. Protect work from UV light damage.
E. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.
F. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Corner Guards: Subject to compliance with these Specifications, provide products of one of the following manufacturers:
   1. Construction Specialties, Inc: www.c-sgroup.com.
   2. Inpro: www.inprocorp.com. (Basis of Design)
   3. Koroseal Interior Products: www.koroseal.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PRODUCT TYPES

A. Corner Guards - Type CG-1:
   1. Material: Metal with plastic cover.
   2. Width of Wings: 3 inches.
   3. Color: As selected by Architect from manufacturer's full range of standard and non-standard colors. Project may include more than one color..
   4. Length: One piece, 4 feet standard length, unless otherwise indicated on Drawings.
   5. Provide wall end protectors to fit width of partition and finish where exposed end wall conditions occur.
   6. Basis of Design Product: Construction Specialties, Inc.; Acrovyn SM-20N.
B. Corner Guards - Type CG-2:
   1. Material: Type 304 stainless steel, No. 4 finish.
   2. Thickness: 16 gage, 0.06 inch.
   3. Width of Wings: 3-1/2 inches, (Model CO-8M) at single corners.
   4. Length: One piece, 4 foot standard length unless otherwise shown on Drawings.
   5. U-shaped corner guards at the end of a partition shall be formed out of one continuous piece of metal and tightly fit (Model SCO-8M).

6. Basis of Design Product: Construction Specialties, Inc; CO-8 90 degree, CO-8M custom angle, SCO-8M U-shaped.

C. Provide 90 degree corners and angled configurations to fit wall conditions.

D. Attachment Hardware: As recommended by manufacturer, for component and substrate.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

2.04 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Provide wall and door protection systems of each type from a single source and manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements.

B. Carefully examine installation areas with Installer present, for compliance with requirements affecting work performance.

1. Verify that installation areas are enclosed and weatherproofed prior to commencement of installation.
2. Verify that tolerances, levelness, plumbness, humidity, cleanliness, and other conditions are per manufacturer's recommendations, and ready to receive work.
3. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
4. Verify that field measurements are as instructed by the manufacturer and as indicated on drawings.
5. Verify that substrate surfaces for adhered items are clean and smooth.
6. Proceed with installation only after unsatisfactory conditions have been corrected. Start of installation constitutes acceptance of project conditions.

3.02 INSTALLATION

A. Acclimate materials in an environment of 65 to 75 degrees F, for at least 24 ours prior to beginning installation.

B. Install components in accordance with approved submittals, manufacturer's instructions, ADA Standards, and state and local barrier-free requirements, level and plumb, using only approved mounting hardware, secured rigidly in position to supporting construction.

C. Install corner guards in locations indicated on Drawings, and at each "outside" corner of gypsum board walls and partitions in corridors, circulation spaces, and utility spaces, including but not limited to:

1. Electrical Rooms.
2. Mechanical Rooms.
3. Storage Rooms.
4. Janitor Closets.
5. Corridors, Lobbies, and Circulation Spaces.
6. Elevator Machine Rooms.

D. Install vertical corner guards with bottom edge of guard installed at top edge of wall base material.

E. Adjust installed end caps to ensure tight seams.

F. Provide lengths and configurations to fit conditions shown, including guards to fit corner angles at other than 90 degrees.

G. Position corner guard 4 inches above finished floor to 76 inches high.

3.03 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.

1. Finish touch-up damaged surface finishes.
2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.05 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

C. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

3.06 PROTECTION

A. Protect installed work from construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

SECTION 10 26 41
BALLISTICS RESISTANT PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering and installing the following work:
   1. Laminated fiberglass ballistics-resistant panels.
   2. Accessories required for installation of panels, including fasteners.

B. Panels shall be installed by Section 09 21 16 - Gypsum Board Assemblies for incorporation into stud framed partitions.

1.02 ABBREVIATIONS AND ACRONYMS

A. AR: Abrasion Resistant.

B. BHN: Brinell Hardness Number.

C. ITAR: International Traffic in Arms Regulations.

D. UHMWPE: Ultra High Molecular Weight Polyethylene.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

E. NIJ 0108.01 - Standard for Ballistic Resistant Protective Materials.

F. UL 752 - Standard for Bullet-Resisting Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Manufacturer's current data sheets on each product to be used. Submit manufacturer's product data, including material specifications, catalog information describing products and demonstrating compliance with contract documents.
   2. Shop Drawings: Details of installation of ballistics-resistant panels, including plan views, elevations, sections, and details of the proposed installation required to maintain specified level of bullet resistance, with attachment methods.
   3. Samples: Submit three samples, minimum size 3 inches by 3 inches, for each product specified.
   4. Certificates: Submit printed data to indicate compliance with following requirements.
      a. UL Listing verification and UL 752 Current Test Results as provided by Underwriters Laboratories.
      b. Third party ballistic laboratory test report to confirm NIJ 0108.01 level of protection.
   5. Installer's qualification statement.
   6. Specimen Warranties: Manufacturer warranty, and Installation warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project

Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals

1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranties: Submit executed manufactuer's and installer's warranties, completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name, manufacturer's identification, and required UL and NIJ certification labels until ready for installation.

B. Handle material with care to prevent damage. Stack panels flat, store inside under cover off the ground in a dry location, and protect from other construction activities.

1.08 FIELD CONDITIONS

A. Install products under environmental conditions (temperature, humidity, and ventilation) recommended by manufacturer. Do not install products that are under conditions outside these limits.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide one year manufacturer warranty for materials and workmanship against defects commencing on the Date of Substantial Completion.

C. Installation Warranty: All workmanship shall be guaranteed against defects for a period of one year from the date of installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Laminated Fiber Ballistics-Resistant Panels:

1. Armorcore; www.armorcore.com.
2. C. R. Laurence; www.crlaurence.com.
3. Total Security Solutions: www.tssbulletproof.com. (Basis of Design)

2.02 LAMINATED FIBER BALLISTICS-RESISTANT PANELS

A. General:

1. Laminated fiber ballistics-resistant panels to be non-ricochet type. When struck by a bullet or projectile, the panels to delaminate in such a way that absorbs the energy, stops the projectile, and prevents ricochet or spalling.

B. Performance Requirements:

1. Ballistics Resistance Rating: Listed and labeled as tested in accordance with UL 752 Level 3 (super-power handgun) threat rating.
2. Ballistics Resistance Rating: Listed and labeled as tested in accordance with NIJ 0108.01, Type III-A (.44 Magnum handgun and 9 mm submachine gun) threat rating.

3. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when tested in accordance with ASTM E84.

C. Laminated Fiber Panels:
1. Material: Multiple layers of ballistic grade fiberglass woven roving bonded together with resin and compressed into flat rigid sheets.
2. Panel Thickness: Minimum thickness required for specified UL 752 and NIJ 0108.01 threat level.
3. Panel Weight: Minimum weight required for specified UL 752 and NIJ 0108.01 threat level.
4. Attachment Method: Mechanical fasteners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installing the bullet resistant material, the Contractor shall verify that all substrates and supports have been installed and prepared per requirements of the Contract Documents and Architectural Drawings.
B. Verify all openings.
C. Verify that all in-wall utilities such as junction boxes and other devices or equipment are located or installed prior to installing panels.
D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Commencement of the work of this Section constitues acceptance of substrate conditions.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation of this work.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions, and in accordance with UL 752.

3.03 INSTALLATION

A. Install panels in accordance with manufacturer's instructions and shop drawings, in proper relationship with adjacent construction, and in accordance with UL 752. Install fire-rated assemblies in accordance with NFPA 80.
1. Extend panels full height of partition in which they are located, from floor slab below to solid structure or roof deck above, fitting panels tightly to maintain ballistics-resistive rating at panel junctures with concrete floor and roof slabs, bullet-resistive door and window frames, and required penetrations.
B. Reinforce panel joints with a minimum 4 inch wide back-up layer of ballistics-resistant material, at all joints, centered on panel joints. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel.
1. Install boards with minimum 4 inch clearance behind per manufacturer recommendations.
C. Secure panels using screws.
D. Attach bullet resistant panels to metal stud wall framing at spacing recommended by manufacturer.
E. Installation tolerance shall not exceed 1/16-inch for squareness, alignment, twist and plumb.

3.04 PROTECTION

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Immediately cover with gypsum wall board finish surface to protect installed materials.
C. Protect installed panels from subsequent construction operations.
D. Touch-up, repair or replace damaged panels before Date of Substantial Completion.

END OF SECTION

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating. furnishing, and delivering the following accessories, for installation by Section 06 20 00 - Finish Carpentry.
   1. Commercial toilet accessories.
      a. Toilet paper dispensers.
      b. Paper towel dispensers.
      c. Waste receptacles.
      d. Combination towel dispenser/waste receptacles.
      e. Soap dispensers.
      f. Mirrors, framed.
      g. Grab bars.
      h. Sanitary napkin disposal units.
   2. Changing stations.
      a. Baby changing tables.
   3. Utility room accessories.
      a. Combination utility shelf / mop and broom holders.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA. Americans with Disabilities Act; www.ada.gov.
B. ASTM: ASTM International; www.astm.org.
C. GSA: U.S. General Services Administration; www.gsa.gov.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
D. ASTM C1036 - Standard Specification for Flat Glass.
E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror.
F. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use.
G. GSA CID A-A-3002 - Mirrors, Glass.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination per the requirements of Section 01 31 14 - Coordination, and as follows:
B. Coordinate the placement of rough wall openings and installation of blocking with the following sections:
   1. 06 10 00 - Rough Carpentry.
   2. 09 21 16 - Gypsum Board Assemblies.
C. Coordinate reinforcement of toilet partitions with toilet partition contractor.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals

1. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
2. Certifications: Lead-free; hexavalent chromium-free finishes.
3. Specimen warranties.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
a. Include documentation of:
1) Recycled content: post-consumer and pre-consumer recycled content.

D. Closeout Submittals
1. Submit in accordance with the following:
a. Section 01 70 00 - Execution and Closeout Requirements.
b. Section 01 78 00 - Closeout Submittals
2. Service and Parts manuals including the name of the local representative to be contacted in the event of need of field service or consultation.
3. Operation and Maintenance Data: Cleaning and maintenance recommendations.
4. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Regulatory Agency Approvals:
1. Toilet, bath, and laundry accessories: Comply with ADA requirements.

B. Single source responsibility: furnish toilet, bath, and laundry accessory items of each type from one manufacturer for entire Project, unless otherwise acceptable to Architect.

C. Finishes shall be lead-free; and hexavalent chromium-free.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, and the following:
1. Requirements of Section 01 60 00 - Product Requirements.
2. Store in dry location. Maintain protective covers on all units until installation is complete. Remove covers at final clean up of installation.

1.08 WARRANTY

A. Manufacturer/ Special Warranty:
1. Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
2. Mirrors: Ten year limited warranty against silver spoilage for glass.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Commercial toilet, bath, and utility room accessories: Subject to requirements of these specifications, and except as otherwise indicated in these specifications, provide products of one of the following:
1. American Specialties, Inc: www.americanspecialties.com.
2. Bobrick Washroom Equipment, Inc., www.bobrick.com. (Basis of Design manufacturer, except where otherwise noted.)

3. Bradley Corporation: www.bradleycorp.com.
4. Rubbermaid Commercial: www.rubbermaidcommercial.com. (Basis of Design manufacturer for freestanding waste receptacles.)
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Changing Stations: See products / manufacturers listed in CHANGING STATIONS paragraph, below.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.

B. Keys: Provide two keys for each accessory to Owner; provide master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666/A666M, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

G. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

C. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser (TPD): Double roll, surface-mounted, stainless steel unit with pivot hinge , tumbler lock.
   1. Basis of Design Product: Bobrick; B-2892.

B. Paper Towel Dispenser (PTD): Manual, roll paper type.
   1. Material: Thermoplastic polymer.
   2. Paper Discharge: Manual dispense by lever operation.
   3. Capacity: 8-inch diameter roll.
   4. Mounting: Surface mounted.
   5. Refill Indicator: Transparent viewing slot.

C. Waste Receptacle (WR): Plastic, freestanding style.
   1. Provide one waste receptacle at each room that includes a "PTD" unit.
   2. Minimum capacity: 20 gallons.
   3. Dimensions: 1.5 inches wide by 20.6 inches long by 30 inches high.
   4. Basis of Design Product: Rubbermaid Commercial; Slim Jim, with handles.

D. Combination Towel Dispenser/Waste Receptacle: Semi-recessed with projecting waste receptacle, stainless steel; seamless wall flanges, continuous piano hinges, tumbler locks on upper and lower doors.
   1. Waste receptacle liner: Reusable, heavy-duty vinyl.
   2. Towel dispenser capacity: Roll.

3. Waste receptacle capacity: 12 gallons.
4. Basis of Design Product: Bobrick; _____.

E. Soap Dispenser (SD, or CLD-SD, or PK-SD): Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and vertical tank; push type soap valve, check valve, window-gage refill indicator, and tumbler lock.
1. Minimum Capacity: 40 ounces.
2. Basis of Design Product: Bobrick; B-2111.

F. Mirrors, Framed (MIRR, or CLD-MIRR): Stainless steel framed, 6 mm thick annealed float glass; ASTM C1036.
1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503 and GSA CID A-A-3002.
2. Size: 18 inches wide by 36 inches high, unless otherwise indicated on drawings.
3. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No. 4 finish.
4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material. Back shall be secured to concealed wall hanger with theft-resistant locking device.
5. All exposed surfaces shall have polished finish.
6. Basis of Design Product: Bobrick; B-165.

G. Grab Bars (GB Types): Type 304, stainless steel, 1-1/2 inches outside diameter (unless designated as PK-GB, in which case outside diameter shall be 1 inch), minimum 0.05 inch (18 gage) wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar, unless noted otherwise; accessible.
1. Length and Configuration: As indicated on drawings.
2. Basis of Design Products: Subject to compliance with these specifications, provide products of one of the following:
a. GB, or CLD-GB Basis of Design Product: Bobrick; B-6806 series.
b. PK-GB Basis of Design Product: Gamco, a Division of Bobrick; 100CT series, inch outside diameter, safety textured grip surface.
c. SGB Basis of Design Product: Bobrick; B-6861 series.

H. Sanitary Napkin Disposal Unit (SND, or CLD-SND): Stainless steel, back-to-back partition mounting with adjustable flanges, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
1. Basis of Design Products:
a. At partitions between two compartments: Bobrick; B-354.
b. At end stalls or single user toilet rooms: Bobrick; B-254.

2.05 CHANGING STATIONS

A. Baby Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
1. Configuration: Horizontal.
2. Material: Stainless steel shell with polyethylene body.
3. Mounting: Recessed.
4. Color: As selected by Architect from manufacturer's full range.
5. Minimum Rated Load: 250 pounds.
6. Provide changing tables without integral bed cover dispensers.
7. Products: Subject to compliance with these specifications, provide products of one of the following:

a. American Specialties, Inc.; 9013 Baby Changing Station, Recessed: www.americanspecialties.com
b. Bradley Corporation; Model 962, Recessed Baby Changing Station: www.bradleycorp.com.
c. Koala Kare Products; KB310-SSRE Horizontal Recessed Mount: www.koalabear.com. (Basis of Design)
d. Saniflow Hand Dryer Corporation; Babymedi Horizontal with stainless steel recess kit: www.saniflowcorp.com.
e. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.06 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder (MH): 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
1. Hooks: Two, 0.06 inch stainless steel rag hooks at shelf front.
2. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
3. Length: Manufacturer's standard length for number of holders/hooks.
4. Basis of Design Product: Bobrick B-224.
a. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Carefully examine installation areas with Installer present for compliance with requirements affecting the work.
1. Verify exact location of accessories for installation.
a. Coordinate locations and rough openings dimensions for recessed accessories as walls are being framed. Notify Architect promptly of any conflicts with other recessed equipment, and structural framing.
2. Verify that field measurements are as indicated on drawings. Verify that clearances, substrates, structural blocking, reinforcing plates, and concealed anchors in walls and ceilings, tolerances, levelness, plumbness, cleanliness and other conditions are within tolerance requirements of the manufacturer and ready to receive work.
3. Examination and acceptance of conditions shall be per Section 01 40 00 - Quality Requirements.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.
B. Provide templates and rough-in measurements to Construction Manager for coordination with other subcontractors.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights: Per the most restrictive applicable accessibility regulations, as indicated on drawings..

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Remove, repair and reinstall or restore-in-place damaged items:

1. Finish touch-up damaged surface finishes.
2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.05 ADJUSTING

A. Test accessories and adjust for proper operation, by methods recommended by manufacturer.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean exposed surfaces, by methods recommended by manufacturer.

3.07 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations until date of Final Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 10 43 00
EMERGENCY AID SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, and delivering emergency aid specialties:
   1. Automated external defibrillators (AEDs).
   2. Automated external defibrillator (AED) cabinets.
   3. Accessories required for a complete installation.

1.02 DEFINITIONS

A. Automated External Defibrillator (AED): A Food and Drug Administration (FDA)-approved portable device, which automatically analyzes the heart rhythm and recognizes the presence of ventricular fibrillation and/or tachycardia. If defibrillation is warranted, the AED automatically charges and prompts (visual and/or audio) the operator to deliver an electrical shock.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Provide AED operational features, color and finish, and anchorage details.
   2. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
   3. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00-Execution and Closeout Requirements and Section 01 78 00-Closeout Submittals.
   2. Maintenance Data: Include test schedules and recertification requirements.
   3. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.04 WARRANTY

A. AED units shall be warrantied for a minimum of five yeas, with four-year minimum warranty on batteries.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Automated External Defibrillators (AEDs): Subject to compliance with these specifications, provide AED units from one of the following
   1. Defibtech Lifeline View AED.
   2. Philips Medical Systems; Heartstart FR3: www.usa.philips.com.
   3. Stryker Corporation; HeartSine Samaritan PAD 350P Defibrillator - PAD 350p : www.stryker.com/#sle.
   4. ZOLL Medical Corporation: www.zoll.com.

5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 AUTOMATED EXTERNAL DEFIBRILLATORS (AEDS)

A. Automated External Defibrillators (AEDs) - General: FDA approval required.

B. Fully automatic battery powered units meeting American Heart Association's current guidelines for performing CPR and use of AED units, self charging with audible alert when unit is malfunctioning or lacking charge.

C. Once pads are applied to patient, unit shall be capable of analyzing heart rhythm, delivering shock via pushbutton control, and providing voice commands such that specialized training is not required to operate the unit.

D. AEDs shall provide automatic self-testing of pads on a daily basis, and partial energy charge on a weekly basis.

E. AEDs shall be lithium ion battery powered with minimum two-year standby life.

F. AEDs shall have internal memory for time stamping and event documentation, including recording of one hour of ECG data, and playback via computer USB connection.

G. AEDs shall have LCD screen for display of instructions.

H. Provide carry case for unit, pads, and accessory items, specially fabricated and sized for the unit being provided.

I. Provide adult sized pads, all cables, connectors, and accessories necessary for a complete turn-key installation.

J. Cabinets:

1. Cabinets shall be designed for semi-recessed wall installation, with not more than 4 inches of projection of cabinet from surface of wall.
2. Cabinets shall be sized to fit AED units.
3. Cabinets shall be of same manufacturer as AED unit.
4. 20 gage Powder coated steel construction for semi-recessed installation with non-locking door. Door to include magnetic catch and identification graphics for "AED" and "Pull to Open".
5. Cabinet to include strobe light and audible 85 db local alarm, when door is opened. Include key switch for local deactivation of alarm.

2.03 ACCESSORIES

A. Cabinet Door Signage: 'AED” decal, or vinyl self-adhering, pre-spaced black lettering and identifying graphic in accordance with authorities having jurisdiction (AHJ).

B. Plastic Wall Signage: Tent style.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00-Quality Requirements, and as follows:

1. Verify that field measurements, rough openings, substrates, structural support and blocking, tolerances, levelness, plumbness, cleanliness and other conditions are within acceptable tolerance requirements of the manufacturer, and ready to receive work.
2. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. The items of this Section shall be installed by Section 06 20 00-Finish Carpentry in strict accordance with the Drawings, approved submittals, and as follows:

1. Install in accordance with manufacturer's instructions.

2. Install cabinets plumb and level, at locations and heights indicated on Drawings .
3. Secure rigidly in place.
4. Place AEDs in cabinets.
5. Wall Signs:
   a. Location: Where shown on Drawings.
   b. Apply on walls after field painting is completed and has been accepted.
6. Cabinet Lettering:
   a. Location: Face of door framing.

3.03 ADJUSTING, CLEANING, AND PROTECTION

A. Comply with requirements of Section 01 74 19-Construction Waste Management and Disposal.
B. Remove temporary protective coverings and strippable films, if any, as cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
C. Adjust cabinet doors to operate smoothly without binding. Verify that alarms and integral locking devices operate properly.
D. On completion of cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
E. Touch up marred finishes. Replace cabinets that cannot be restored to factory-finished appearance. Use materials and procedures recommended by cabinet manufacturer.
F. Protect installed work from damage during construction operations until date of Substantial Completion or Owner occupancy, whichever comes first.

3.04 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals for closeout submittals.
B. See Section 01 79 00 - Demonstration and Training for additional requirements.
C. Demonstrate proper operation of AED to Owner's designated representative.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, and delivering the following work, for installation by Section 06 20 00 - Finish Carpentry:
   1. Fire extinguishers.
   2. Fire extinguisher cabinets.
   3. Rapid entry system, with recessed mounting kit.
   4. Accessories.

B. Related work: Fire alarm connection to be wired and installed into cabinets by Electrical subcontractor.

1.02 ABBREVIATIONS AND ACRONYMS

A. NFPA. National Fire Protection Association; www.nfpa.org.

B. UL. Underwriters Laboratories; www.ul.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.

B. NFPA 10 - Standard for Portable Fire Extinguishers.

C. UL 437 - Standard for Key Locks.

D. UL 1037 - Antitheft Alarms and Devices.

E. UL 1332 - Standard for Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment.

F. UL 1610 - Central-Station Burglar-Alarm Units.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals:
   1. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, installation instructions, and automatic defibrillator operational features.
      a. Provide extinguisher operational features.
   2. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions, for extinguishers and AEDs, referenced on a key plan of the building.
   3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:

D. Closeout Submittals

1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 QUALITY ASSURANCE

A. Regulatory Agency Approvals: Conform to NFPA 10 requirements for portable fire extinguishers.

B. Single Source Responsibility: Furnish system materials from one manufacturer for entire Project, unless otherwise acceptable to Architect.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these Specifications, provide fire extinguishers, cabinets, and accessories from one of the following:

1. Fire Extinguishers:
   a. Activar Construction Products Group, Inc. - JL Industries; Cosmic Extinguisher - Multipurpose Chemical: www.activarcpg.com/#sle.
   b. Larsen's Manufacturing Co.: www.larsensmfg.com. (Basis of Design)
   c. Potter-Roemer: www.potterroemer.com/#sle.
   d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
1. Class: A:B:C type.
2. Finish: Baked polyester powder coat, red color.
3. Basis of Design model: Larsen's; MP-10.

C. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
1. Class: K type.
2. Size: 6 liters.
3. Finish: Polished stainless steel.

2.03 WHEELED FIRE EXTINGUISHERS

A. Wet Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
1. Class: K type.
2. Size: 6 liters.
3. Finish: Polished stainless steel.
4. Temperature range: Minus 20 degrees F to 120 degrees F.

2.04 FIRE EXTINGUISHER CABINETS

A. Fire Rated Cabinet Construction: UL listed with UL Listing Mark with rating to match wall in which cabinet is installed.

B. Cabinet Configuration: Semi-recessed type.
1. Basis of Design model: Architectural Series, with Vertical Duo V-Style Door.
2. Size to accommodate extinguisher and accessories.
3. Projected Trim: Returned to wall surface, with 2-1/2 inch projection, and 1-3/4 inch wide face.

C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with roller type catch. Hinge doors for 180 degree opening with two butt hinges.
D. Door Glazing: Float glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.
E. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
F. Fabrication: Weld, fill, and grind components smooth.
G. Cabinet Finish:
    1. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.
    2. Finish of Cabinet Interior: White colored enamel.

2.05 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.
B. Graphic Identification:
    1. Provide manufacturer's standard engraved or silk-screened projecting signage for surface mount application to walls above recessed cabinets.
        a. Provide red graphics and text on white background.
        b. Basis of Design: PTD-108.
    2. Type K Extinguisher Placard:
        a. Signage meeting the requirements of NFPA 10 Appendix A.
        b. White text and graphics on red background.
        c. Text to read:

WARNING

IN CASE OF APPLIANCE FIRE, USE THIS EXTINGUISHER AFTER HOOD SUPPRESSION SYSTEM HAS BEEN ACTIVATED.

        d. Include pictogram of fire extinguisher.
        e. Sign shall measure approximately 8 inches high by 11 inches wide.

2.06 RAPID ENTRY SYSTEMS

A. Manufacturers:
    1. Subject to meeting requirements of this specification, provide rapid entry systems from the following:
        a. Knox Company; KnoxBox 3200: www.knoxbox.com, or equal. (Basis of Design)
        b. Or equal. Substitutions: The Awarding Authority has determined that use of the product listed is in the project's and public's best interests and has voted to designate the listed product as a proprietary bid product. See Sections 01 10 00 and 01 25 00.
    2. Mounting: Recessed. Coordinate with Section 04 20 00 - Unit Masonry.
    3. Capacity: 10 keys.
    4. Exterior Dimensions:
        a. Body: 4 inches high by 5 inches wide by 3-7/8 inches deep.
        b. Recessed Mount Flange: 7 inches high by 7 inches wide.
    5. Product shall comply with UL 437, UL 1037, UL 1610, and UL 1332.
    6. Weather-resistant door gasket.
    7. Hinged door, opens to side.
    8. Color: Aluminum.
    9. Finish: Knox-Coat proprietary finish.
    10. Provide key tags and key rings.
    11. Lock: UL listed. Double-action rotating tumblers and hardened steel pins accessed by bias cut key.

12. Tamper Alert: connect to building's alarm system. Coordinate with Section 26 00 10 - Electrical.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, rough openings, substrates, structural support and blocking, tolerances, levelness, plumbness, cleanliness and other conditions are within acceptable tolerance requirements of the manufacturer, and ready to receive work.
      b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. The items of this Section shall be installed by Section 06 20 00 - Finish Carpentry in strict accordance with the Drawings, approved submittals, State building code and NFPA 10 requirements, and as follows:
   1. Install in accordance with manufacturer's instructions.
   2. Install cabinets plumb and level in wall openings, 48 inches from finished floor to inside top of cabinet.
   3. Secure rigidly in place.
   4. Place extinguishers in cabinets and on wall brackets.
      a. Do not place extinguishers when risk of freezing temperatures exist.
   5. Provide completed inspection / service tags on all extinguishers.

B. Provide one dry chemical fire extinguisher (FE) on bracket in each Elevator Machine Room, whether or not indicated on plans.

C. Provide one wet chemical fire extinguisher (FE-K) on bracket in each commercial kitchen cooking area within 30 feet of the cook line equipment. Coordinate location in field with foodservice equipment locations and Owner to assure proper access and function of kitchen equipment.

D. Provide graphic identification at each semi-recessed fire extinguisher cabinet and type FE-K extinguisher.
   1. Locate signs for fire extinguisher cabinets at 80 inches above floor to center of sign.
   2. Locate placard for type FE-K extinguishers at 60 inches above floor to center of sign.

3.03 CLEANING AND PROTECTION

A. Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Protect installed work from damage during construction operations until date of Substantial Completion or Owner occupancy, whichever comes first.

END OF SECTION

SECTION 10 51 13
METAL LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following locker system work:
   1. Metal lockers, including accessories described herein:
      a. Finished sloped and flat metal tops for lockers.
      b. Integral hasps for combination locks. Locks will be supplied by Owner.
      c. Enclosed integral metal bases for locker.
      d. Finished end, trim, and filler panels.
   2. All accessories, fasteners, and appurtenances required for a complete installation.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Construction Submittals
   1. Product Data: Manufacturer's published data on locker construction, sizes and accessories, identifying locker and bench types, materials, components, finishes, and manufacturer's recommended use limitations.
   2. Shop drawings: Indicate locker plan layout, including accessible lockers, numbering plan and combination lock code.
   3. Samples: Submit two samples 3 by 6 inches in size, of each color scheduled, showing color and finish of metal locker material; applied to specified base metal.
   4. Qualification statements: Installer.
   5. Manufacturer's specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Recycled content: post-consumer and pre-consumer recycled content.
D. Closeout Submittals
   1. Submit in accordance with 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Company with a minimum of three years of experience specializing in work of the type required by this Section.
B. Single Source Responsibility: Furnish locker and bench system materials from one manufacturer for entire project, unless otherwise specified herein or acceptable to Architect.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, and Section 01 60 00 - Product Requirements.
   1. Protect finishes and adjacent surfaces from damage.

1.05 WARRANTY

A. Prepare and submit manufacturer's material and workmanship warranty, in accordance with Section 01 78 00 - Closeout Submittals.
   1. Metal Lockers: Provide written lifetime warranty against defects in materials and workmanship excluding finish and damage resulting from deliberate destruction and vandalism.
   2. Knockdown Wardrobe Lockers: Provide written two-year warranty against defects in materials and workmanship excluding finish and damage resulting from deliberate destruction and vandalism.
   3. Warranties shall be issued by manufacturer(s) upon completion of the work, and beginning on date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these specifications, provide products of one of the following:
   1. Standard Metal Lockers - Kitchen staff lockers, Custodial lockers:
      a. Art Metal Products; AMP-1003E Champ Corridor Elite Lockers: www.artmetalproducts.com. (Basis of Design)
      b. List Industries, Inc; Classmate Premier Series: www.listindustries.com.
      c. Penco Products, Inc; Welded GEN2 Lockers: www.pencoproducts.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
   2. Knockdown Wardrobe Lockers:
      a. Art Metal Products: AMP Standard KD Wardrobe Lockers: www.artmetalproducts.com. (Basis of Design)
      b. List Industries, Inc: Marquis Student Lockers; www.listindustries.com.
      c. Penco Products, Inc: Vanguard Knocked Down Steel Lockers; www.pencoproducts.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 LOCKER APPLICATIONS

A. Standard: Metal lockers, wall mounted for base indicated on Drawings.
   1. Locker Dimensions: As indicated on Drawings.
   2. Configuration: As indicated on Drawings.
   3. Fittings: Size and configuration as indicated on Drawings.
      a. Hat shelf.
      b. Hooks:
         1) Two single prong wall hooks.
         2) One double prong ceiling hook.
      c. Rubber bumper.
   4. Ventilation: Provide stamped ventilation louvers in face of door near top and bottom of door panel. Provide solid side and back pane
   5. Provide sloped top.

B. Knockdown Wardrobe Lockers:
   1. Locker Dimensions: As indicated on Drawings.
   2. Configuration: As indicated on Drawings.
   3. Fittings:
      a. Hat shelf.
      b. Hooks:
         1) Two single prong wall hooks.
         2) One double prong ceiling hook.
      c. Rubber bumper.
   4. Ventilation: Provide stamped ventilation louvers in face of door near top and bottom of door panel. Provide solid side and back pane
   5. Locking: Built-in combination locks for master key system.
   6. Provide flat top.

2.03 METAL LOCKERS

A. Locker Case Construction:
   1. Heavy-Duty, Welded Construction: Made of formed and welded together sheet steel; metal edges finished smooth without burrs; baked enamel or powder coat finished inside and out.
      a. Assembly: Do not use bolts, screws, or rivets to assemble locker bodies.
      b. Locker Body Components: Formed and flanged from steel sheet of the following type and minimum thicknesses:
         1) Body and Shelves: 16 gauge, 0.0598 inch, for solid top, bottom, sides, hat and intermediate shelves
         2) Backs: 18 gauge, 0.0478 inch.
         3) Base: Minimum 16 gauge, 0.0598 inch.
            (a) Height: 4 inches.

B. Doors: Hollow Hollow channel edge construction, 1-3/16 inch thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth. Provide full height channel door stiffener welded to inner door face along hinge edge of door:
   1. 14 gage minimum plain doors
   2. Door Inner Face: 18 gauge, 0.0478 inch, minimum.
   3. Form recess for operating handle and locking device.

C. Latches and Door Handles: Manufacturer's standard.

D. Hinges: Continuous piano hinge, welded to door and riveted to frame, with powder coat finish to match locker color.
   1. Hinge Thickness: 16 gage.

E. Latching: Multi-point latching. Weld latching points to side of door frames to engage locking device. Design and gage of latching lugs at these points shall prevent freeing of locking device by prying.
   1. Recessed brushed stainless steel handle.
   2. Each latching point shall have replaceable rubber silencer.
   3. Provide two latching points per each double-tier door.
   4. Provide three latching points per each single-tier

F. Provide sloped tops at all lockers, unless specifically indicated otherwise. in lengths as long as practical, but not less than four lockers.
   1. Sloped Top: 16 gage, with closed ends. Install in addition to the integral locker flat tops, with end closures for support. Finish to match lockers.

2. Finish to match lockers.

G. Closure / Filler Trim: 16 gage.

H. Coat Hooks: Stainless steel or zinc-plated steel.

I. Number Plates: Provide manufacturer's standard rectangular shaped, applied brass or aluminum plates, attached to door face with ri. Form numbers 3/8 inch high minimum, of block font style with ADA designation where applicable, in contrasting color,, embossed or etched.
   1. Obtain numbering sequence of lockers from Owner.

J. Locks:
   1. Where scheduled for built-in locks, provide Master Lock type 1630 or 1670 series.
   2. At accessible lockers provide Master Lock type 1676MKADA series.
   3. Master key all locks per Owner's master schedule. Provide two keys per lock and four master keys.
   4. Provide hasps for combination locks. Locks will be supplied by Owner.

2.04 KNOCKDOWN WARDROBE LOCKERS

A. Provide knockdown wardrobe lockers, square, rigid and without warp, with metal faces flat and free from dents or distortion. All exposed metal edges shall be safe to touch. Frame members shall be welded together to form rigid, one-piece structure. Joints and connections shall be welded, bolted, or riveted, as standard with manufacturer. Exposed welds shall be ground flush. Bolts or rivet heads shall not be exposed on fronts of locker doors or frames except for fastening of number plates and recessed handle.
   1. Frame: 16 gauge minimum channels, with integral continuous door stop/strike formed on both latch and hinge side vertical members. Cross frame members of 16 gauge channel shapes, including intermediate cross frame members on double and triple tier (frames with doors over 18 inches high) lockers shall be securely welded to the vertical framing members to ensure rigidity.
   2. Body: Back and sides shall be 24 gauge minimum sheet steel, with double flanged connections extending full height. Top, bottom and intermediate tier dividers shall be 24 gauge minimum sheet steel with single return bends at all sides. Top and bottom as well as horizontal tier dividers of wardrobe openings shall be bolted to front horizontal frame members at not less than one place in addition to side panels.
   3. Shelves: 24 gauge minimum.
   4. Doors: Doors 20 inches high and over shall be fabricated from single sheet prime 16 gage minimum. Doors 9 inch wide, as well as two-person and duplex doors, shall be 18 gage minimum. Single bends at top and bottom and double bends at the sides. The channel formed by the double bend at the latch side shall fully conceal the lock bar. Doors shall be louvered. Upper compartment doors of two-person lcokers shall be non-louvered.
   5. Hinges: 16 gauge continuous piano hinge welded to the door and riveted to the frame.
   6. Locker Handle: seamless, recessed, not less than 304 stainless steel, shaped to receive a built-in combination lock or padlock.
   7. Latch Assembly: Finger lift control type constructed of 14 gauge (minimum) steel with a nylon cover. Spring activated nylon slide latches shall be completely enclosed in lock channel allowing doors to close with lock in the locked position. Lock bar shall be hot dip galvanized. Locking device shall be designed for use with either built-in combination locks or padlocks. Latch hooks shall be securely welded to the vertical frame channel on the strike side to engage the nylon slide latches. Minimum three latch hooks for doors 48 inches and higher, minimum two latch hooks for doors under 48 inches high.
   8. Locks:
      a. Where scheduled for built-in locks, provide Master Lock type 1630 or 1670 series.

b. At accessible lockers provide Master Lock type 1676MKADA series.
c. Master key all locks per Owner's master schedule. Provide two keys per lock, and four master keys.
d. Provide hasps for combination locks. Locking devices will be supplied by Owner.

2.05 ACCESSIBLE LOCKERS

A. Provide accessible lockers, in quantities of not less than five percent of each locker type, in locations indicated on Drawings. If no locations are indicated, provide accessible lockers at locations closest to main paths of travel, or at ends of locker arrays. Submit locations for review.
B. Provide ADA symbol sign with each accessible locker.
C. At single-tier lockers, mount hat shelf no more than 46 inches above finished floor to top edge of shelf.

2.06 FINISH

A. Shop finish locker units: one color per unit, unless otherwise noted in this Section or on Drawings. Baked enamel finish, unless otherwise indicated above. Pretreated to clean condition, one coat primer, and minimum two coats epoxy-based enamel.
B. Locker unit colors will be selected by Architect, from manufacturer's full line of standard and custom colors.
1. Multiple colors may be selected on project.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions per Section 01 40 00 - Quality Requirements, and as follows:
1. Carefully examine installation area with installer/applicator present, for compliance with requirements affecting work performance.
a. Verify that field measurements, substrates, structural support, tolerances, levelness, plumbness, cleanliness, and other conditions are within acceptable requirements of the manufacturer, and ready to receive work.
b. Verify that prepared bases are in correct position and configuration.
c. Verify bases and embedded anchors are properly sized.
2. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of installation constitutes acceptance of conditions of substrates.

3.02 INSTALLATION

A. Install in accordance with Drawings, submittals, and manufacturer's instructions.
B. Install barrier free accessible lockers in quantity required by code, whether or not specifically indicated on Drawings. Locate accessible lockers to allow for easiest access.
1. At Locker Rooms and _____ locate accessible lockers at ends of each aisle, and/or as indicated on Drawings. Coordinate location of each accessible locker with Architect prior to installation.
C. Place and secure on prepared base.
D. Install lockers plumb and square.
E. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.
1. Use anchors of type recommended by manufacturer for secure anchorage to applicable substrate construction.
F. Bolt adjoining locker units together to provide rigid installation.
1. Space fastenings and reinforce to prevent metal distortion.
2. Conceal fasteners whenever possible.

G. Install end panels, filler panels, and sloped tops to provide flush, hairline joints, with concealed fasteners as follows, unless specifically indicated otherwise:
   1. Where sides of arrays of lockers are shown abutting adjacent construction, Construction Manager shall provide filler panels to conceal gaps between faces of lockers and adjacent construction.
   2. Where arrays of lockers are shown abutting construction at each side of the array, Construction Manager shall provide filler panels of equal size at each side of the array, unless specifically indicated otherwise on drawings.
   3. Where lockers are shown fully recessed in wall construction, Construction Manager shall provide closure / filler panels at each end and at top of locker array, to conceal all gaps.
   4. Where sides of freestanding lockers in back-to-back configuration are exposed, provide finished end panels.
   5. At sloped tops, provide angled top filler panels to cover void space at corners of lockers.
   6. Where lockers have flat tops and are installed under soffits, provide locker manufacturer's continuous trim along top of locker array, to close gap, unless specifically otherwise indicated.

H. Install fittings and accessories, if not factory installed.

I. Adjust doors and latches to operate easily without binding.

3.03 FIELD QUALITY CONTROL

A. Refer to Section 01 40 00 - Quality Requirements for additional requirements.

B. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Replace components that do not operate smoothly.
   2. Finish touch-up marred or damaged surface finishes.
   3. Replace damaged materials with new if repair is not acceptable to Architect.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean locker interior and exterior surfaces, by methods recommended in writing by manufacturer.

3.05 PROTECTION

A. Protect installed work from construction operations until date of Final Completion, or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 10 71 13.43
FIXED SUN SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Modular, shop fabricated, extruded aluminum sun screens to be mounted on structure provided by Section 08 00 01 - Metal Windows Trade Bid Summary.

1.02 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
   1. AAMA. American Architectural Manufacturers Association; www.aamanet.org.
      a. AAMA 611 - Specification for Anodized Architectural Aluminum.
      b. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
   2. ASTM. ASTM International; www.astm.org.
      a. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
      b. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing all profiles, sections of all components, finishes, fastening details, and manufacturer's technical and descriptive data. Include field dimensions of openings and elevations on shop drawings.
   2. Design Data: Submit comprehensive structural analysis of design for the specified loads. Stamp and sign calculations by a professional engineer licensed to practice in Massachusetts.
   3. Samples: 10 inches by 10 inches minimum illustrating design, workmanship and finish color.
   4. Sample of Louver: For review of shape only.
   5. Designer's Qualification Statement.
   6. Specimen Warranty: Furnish a copy of manufacturer's standard warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.

2. Warranty: Submit executed warranty completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Designer Qualifications: Perform design under direct supervision of a professional engineer experienced in design of this type of work licensed in Massachusetts.

B. Installer Qualifications: Company specializing in performing the work of this Section.

1. With minimum five years of documented experience.
2. Approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site ready for erection.

B. Package using methods that prevent damage during shipping and storage on site.

C. Store materials under cover and elevated above grade.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Sun Screens: Correct defective work within a one year period after Date of Substantial Completion.

C. Finish Warranty: Provide manufacturer's one year warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fixed Aluminum Sun Screens: Subject to compliance with these specifications, provide products of one of the following:

1. Same manufacturer as curtain wall to which sun screens are to be attached.
2. EFCO, a Pella Company; MaxBlock® Z-Blade Sun Shade. (Basis of Design)
3. Kawneer North America; Versoleil® SunShade – Outrigger System – for Curtain Wall www.kawneer.com.
4. Oldcastle Building Envelope; Solar Eclipse™ Outrigger Sunshade: www.obe.com.
5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 SUN SCREENS

A. Aluminum Sun Screens: Shop fabricated, shop finished, extruded aluminum outriggers, louvers, and fascia, free of defects impairing strength, durability or appearance.

1. Configuration: As indicated on drawings.
2. Louver Type: Bar.
3. Outrigger Shape: Straight.
4. Design Criteria: Design and fabricate to resist the following loads without failure, damage, or permanent deflection:
   a. Wind: per Structural drawings.
   b. Snow: per Structural drawings.
   c. Live: per Structural drawings.
   d. Thermal Movement: Plus/minus 1/8 inch, maximum.
5. Sizes: As indicated on drawings.
6. Provide a complete system ready for erection at project site.

2.03 MATERIALS

A. Aluminum Coated Steel Sheet: ASTM A792/A792M.

B. Concealed Structural Supports: Aluminum, or steel coated for corrosion resistance and dissimilar metal isolation.
C. Fasteners: ASTM F593 stainless steel or ASTM A307 carbon steel.

2.04 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
B. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.
C. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
D. Finish Color: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and site area for conditions that might prevent satisfactory installation.
B. Verify that dimensions of supporting structure are within plus/minus 1/8 inch of dimensions indicated on shop drawings.
C. Verify that all adjacent painting, roofing, masonry work, and other work that might damage sun screen finish has been completed prior to installation of sun screens.
D. Do not install until after all adjacent painting, roofing and masonry have been completed.
E. Do not proceed with installation until all conditions are satisfactory.

3.02 INSTALLATION

A. Install in accordance with manufacturer's installation instructions.
B. Set units level, plumb, with uniform joints, and aligned with building elements.
C. Separate dissimilar metals using concealed bituminous paint or non-absorbent gasket.
D. Anchor units to structure as indicated on drawings.
E. Do not cut or trim aluminum members without approval of manufacturer; do not install damaged members.

3.03 CLEANING

A. Clean exterior surfaces units of dust and debris; follow manufacturer's cleaning instructions for the finish used.

3.04 PROTECTION

A. Protect units after installation to prevent damage due to other work until Date of Substantial Completion.

END OF SECTION

SECTION 10 75 00
FLAGPOLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes:
   1. Ground-mounted flagpoles made from aluminum.

B. Owner-Furnished Material: Flag[**s**].

C. Related Sections:
   1. Section 03 30 00.13 "CAST-IN-PLACE CONCRETE (SITE)" for cast-in-place post footings.
   2. Section 26 00 10 "ELECTRICAL" for site lighting fixtures.

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
   1. Wind Loads: 125 miles-per-hour.
   2. Load Calculations: Load calculations shall be based on AASHTO and NAAMM standards with the pole designed with a two to one safety factor for 125 miles-per-hour winds, un-flagged with a 1.3 gust factor.
   3. Base flagpole design on nylon or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings: For flagpoles. Include plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
   1. Include section, and details of foundation system for ground-mounted flagpoles.
   2. Provide Massachusetts Professional Engineer stamped certification stating that products comply with requirements and will withstand 90 miles per hour winds when flying an appropriate size flag as described in NAAMM “Flagpole Manual”.

C. Samples for Verification: For each type of exposed finish required, in Manufacturer's standard sizes.

D. Delegated-Design Submittal: For flagpole assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Foundation design to be provided by General Contractor. Foundation dimensions shall be determined by a qualified engineer familiar with site soil conditions, registered in the state of Massachusetts.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.07 QUALITY ASSURANCE

A. Source Limitations: Obtain flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose them into a hard fiber tube or other protective container.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following, or approved equal. Refer to Appendix A for a preliminary design cutsheet of the flagpole:
   1. Concord American Flagpole, 4155 Patriot Drive, Suite 100, Grapevine, TX 76051. Telephone: 855.530-4078; or 276.525-4078; Fax: 276.676-3090; Website: Email: info@concordamericanflagpole.com. Contact Sales Representative: Cody Vaughn, Sales Manager, Telephone: 972.380.8186 ext. 3114 Fax: 972.380.5143; E-mail: cvaughn@concordindustries.com.
   2. All-American Flagpoles. Telephone: 617.699-9902; Website: www.all-americanflagpoles.com; E-mail: gmwolfer@aol.com.
   3. PLP Composite Technologies, Inc., 57 Creamery Road, Fitzwilliam, NH 03447. Telephone: 603.585.3470; Fax: 603.585.3470; Email: info@all-americanflagpoles.com; Website: wwwplpcomp.com. Contact Product Representative: Gary Wolfer, All American Flagpoles; E-mail: gmwolfer@aol.com.

B. Any manufacturer's names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is not a proprietary specification, and it should be noted that "or equivalent" applies to all products denoted herein. It is understood that all manufacturers will have minor variations in configuration, appearance, and product specifications and such minor variations will not eliminate such manufacturers as an equivalent. It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that can supply similar products.

C. Other manufacturer’s products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: see Section 01 25 00 “SUBSTITUTION PROCEDURES”.

2.02 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
   1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
   2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
   3. Provide self-aligning, snug-fitting joints.

B. Exposed Height: 39 feet (11.89 meters).

C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 millimeters).

D. Metal Foundation Tube: Manufacturer’s standard corrugated-steel foundation tube, not less than 0.064-inch- (1.6-millimeter-) nominal wall thickness. Provide with 3/16-inch (4.8-millimeter) steel bottom plate and support plate; 3/4-inch- (19-millimeter-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
   1. Provide flashing collar of same material and finish as flagpole.

2. Provide steel ground protectors extending 12 inches (300 millimeters) above ground and six inches (150 millimeters) belowground for steel flagpoles where flashing collars are not provided.

E. Sleeve for Aluminum Flagpole: PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.
   1. Provide flashing collar of same material and finish as flagpole.

F. Cast-Metal Shoe Base: For anchor-bolt mounting; provide with anchor bolts.
   1. Provide units made from aluminum with same finish and color as flagpoles.
   2. Provide ground spike at grade-mounted flagpoles.

G. Concrete Foundation: See Structural Drawings.

2.03 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
   1. 0.063-inch (1.6-millimeter) spun aluminum, finished to match flagpole.
   2. 20-oz. (0.70-millimeter) copper with 23-karat gold leaf finish.

B. Internal Halyard, Cam Cleat System: 5/16-inch- (eight-millimeter-) diameter, braided polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
   1. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.
      a. Provide with neoprene or vinyl covers.
   2. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Provide two flag clips per halyard.
      a. Product: Subject to compliance with requirements, provide "Quiet Halyard" flag clasp by Lingo.

2.04 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

C. Sand: ASTM C 33, fine aggregate.

D. Elastomeric Joint Sealant: Multicomponent nonsag urethane joint sealant complying with requirements in Section 32 13 73 "JOINT SEALANTS" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.05 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

2.06 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 millimeter or thicker.
   1. Color: Medium bronze.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

D. Place concrete, as specified in Section 03 30 00.13 "CAST-IN-PLACE CONCRETE (SITE)". Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.03 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and Manufacturer's written instructions.

B. Ground Set: Place foundation tube, and steel reinforcement, centered and braced to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure. Install flagpole, plumb, in foundation tube.

1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a two-inch (50-millimeter) layer of elastomeric joint sealant and cover with flashing collar.

C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

D. Mounting Brackets and Bases: Anchor brackets and bases securely through to structural support with fasteners as indicated on Shop Drawings.

END OF SECTION

SECTION 11 22 13.26
TIME CAPSULES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following time capsule work:
   1. Time Capsule, including sealing of capsule, witnessed by the Owner and public, at a time to be determined by Owner.
   2. Installation of capsule in a concealed location within the building construction, as indicated in Drawings.
   3. Accessories, including archival quality storage bags, desiccant packets, and other items specified herein and required to complete the installation.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:
   1. Sequence with construction and coordinate with the Owner to provide archival bags and capsule to Owner for filling prior to close-in of construction at location indicated on plans.

B. Scheduling:
   1. Allow four weeks for Owner to fill archival bags and designate items to be placed into capsule.
   2. Consult with the Owner to determine date for closing and sealing capsule so as not to delay construction schedule.

1.03 SUBMITTALS

A. Submittal Procedures: Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Submit manufacturer's printed product literature including catalog and data sheets, product standards, materials, components, parts list, finishes, accessories, use limitations, and recommendations.
   2. Location plan showing intended location of capsule, and location of commemorative plaque being provided under Section 10 14 00 - Signage, demonstrating proximity of items to each other.
   3. Specimen warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Record Drawing showing the final position of capsule within construction, if substantially different than the intended location.
   3. Test and Evaluation Reports: Report of field testing for water or air leakage.
   4. Warranty, executed in Owner's name.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 - Product Requirements, and as follows:
   1. Deliver items in manufacturer's original unopened protective packaging.
   2. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.
   3. Handle so as to prevent damage to finished surfaces.
   4. Maintain protective covers on all units until installation is complete. Remove covers at final clean up for installation.

1.05 WARRANTY

A. All materials and work of this Section shall be covered by manufacturer's standard warranty but not for less than specified in the Conditions of the Contract.

B. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Time Capsule - Manufacturer List. Subject to compliance with requirements, provide products by one of the following:
   1. American Aluminum Company, 230 Sheffield Street, Mountainside, NJ, 07092: http://www.amalco.com/time-capsules.html.
      a. Product: Century Model PN1275-2 MF.
   2. Erie Landmark Company, 637 Hempfield Hill Road, Columbia, PA 17512: www.erielandmark.com
      a. Product: Rectangular Capsule.
   3. Time Capsules, Inc.; 107 Bauder School Road, Prospect, PA 16052: timcapsulesinc.com.
      a. Product: Custom fabricated time capsule.
   4. Other manufacturer’s products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: see Section 01 25 00 - Substitution Procedures.

2.02 MATERIALS

A. Time Capsule: Walls and end caps shall be minimum 1/8 inch thick aluminum or .075 inch Type 304 Stainless Steel.

B. Size: 12 inch by 12 inch by 24 inch length, or 12 inch diameter by 24 inch length per manufacturer's standard products.

C. Finish: Manufacturer's standard for product specified.

D. Etching / Signage:
   1. Etch or engrave capsule to read "WARNING: TIME CAPSULE" and record the following:
      a. Graphic of Wilmington seal, or other logo art, as determined by Owner.
      b. "WARNING - TIME CAPSULE - DO NOT OPEN".
      c. "Commemorating the completion of Wilmington Elementary School ".
      d. "Sealed this day, (Month, Day, Year. Town, State)".

2.03 ACCESSORIES

A. Moisture absorbing desiccant packets - in quantity recommended by manufacturer based on capsule size.

B. Sealant: for end cap installation as recommended by manufacturer to provide air and watertight seal.

C. 50 archival quality clear storage bags.

D. Provide check valve on end cap or time capsule body for evacuation of air from container following closure.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas with installer present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, substrates, structural support, tolerances, levelness, plumbness, and other conditions are ready to receive work
      b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION / APPLICATION

A. General: Install Time Capsule according to the Drawings, approved submittals, manufacturer's instructions, and as follows:
   1. Sequence with construction and coordinate with the Owner to provide Capsule, end caps , and archival bags to Owner for filling and closing of container prior to close-in of construction at location indicated on Drawings.
   2. Attend public or school ceremony if designated by Owner to assist in placing contents within capsule and seal contents in the presence of the Owner and other ceremony participants.
   3. In presence of Owner and other ceremony participants, close and seal capsule using methods recommended by manufacturer immediately following placement of contents within the capsule by the Owner.
   4. Close and seal capsule as recommended by manufacturer in the presence of the Owner and immediately upon filling by Owner.
   5. Install sealed container concealed within wall construction at location indicated on Drawings.
   6. Brace or secure container (for above ground construction) to prevent movement without puncturing or breaking container seal.
   7. Coordinate final location with location of commemorative plaque so both are in proximity of each other.

3.03 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for substantial completion.
   1. Finish touch up damaged surface finishes.
   2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION

SECTION 11 30 13
APPLIANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following work:
   1. Kitchen appliances.
      a. Refrigerator / Freezer.
      b. Undercounter Refrigerator.
      c. Dishwasher.
   2. Laundry appliances.
      a. Clothes Washer.
      b. Clothes Dryer.
   3. Connections to water lines, refer to Section 22 00 01 - Plumbing Trade Bid Summary for additional requirements.
   4. Accessories required for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA. Americans with Disabilities; www.ada.gov.
B. DOE. Department of Energy; www.energy.gov.
C. EPA. U.S. Environmental Protection Agency; www.epa.gov.
D. FTC. Federal Trade Commission; www.ftc.gov.
E. NSF. NSF International; www.nsf.org.

1.03 REFERENCE STANDARDS

A. Editions of listed Standards as referenced by applicable codes; if no edition is referenced, the current edition applies.
B. ADA Standards - 2010 ADA Standards for Accessible Design.
C. ENERGY STAR - ENERGY STAR.
D. NSF 2 - Food Equipment.
E. UL (DIR) - Online Certifications Directory.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.
      a. Include dimensions and finishes of individual appliances.
      b. Model number and selected options for each appliance.
      c. Preparation instructions and recommendations.
      d. Rough in dimensions and utility connections.
      e. Storage and handling requirements and recommendations.
      f. Installation methods.
      g. List of maintenance parts.
      h. Electrical power requirements.
   2. Appliance Schedule: For appliances; use same designations indicated on Drawings.
   3. Certification: submit manufacturer's written certification that products comply with all applicable requirements of ADA.
   4. Installer qualification statement.

5. Specimen warranties.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Submittal Procedures: Section 01 78 00 - Closeout Submittals.
   3. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   4. Maintenance Material Submittals
      a. Tools: Special tools not otherwise easily available.

1.05 QUALITY ASSURANCE

A. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

B. Installer Qualifications: Company with a minimum of three years experience specializing in work of the type required by this section.

C. Single Source Responsibility: Furnish each type of appliance units and accessory materials from one manufacturer for entire project, unless otherwise acceptable to Architect.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s instructions and recommendations, and Section 01 60 00 - Product Requirements.

1.07 FIELD CONDITIONS

A. Substrate Conditions: Area and substrate shall be clean, level or sloped to meet requirements, and with access to proper drainage and/or electrical power.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer / Special Warranty:
   1. Special Appliance Warranties: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
      a. Refrigerator / Freezer:Provide five (5) year manufacturer warranty on refrigeration system of refrigerators.
      b. Dishwasher: Provide ten year manufacturer warranty on tub and door liner of dishwashers.
      c. Clothes Washer:
         1) Provide three year manufacturer warranty on stainless steel tub.
         2) Provide 20 year manufacturer warranty on direct drive motor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements of these specifications, provide equivalent products from one of the following:
   1. Bosch USA; www.bosch-home.com/us.
   2. Fisher & Paykel Appliances Ltd; www.fisherpaykel.com/us/.
   3. GE (General Electric Company); www.geappliances.com. (Basis of Design, except where otherwise noted)
   4. Hotpoint; www.hotpoint.com.
   5. KitchenAid; www.kitchenaid.com.
   6. LG; www.lg.com.
   7. Maytag; www.maytag.com.
   8. Miele, Inc.; www.mieleusa.com/
   9. Summit Appliance; www.summitappliance.com.
   10. Sharp USA; sharpusa.com.
   11. Whirlpool; www.whirlpool.com.
   12. Wolf; www.subzero-wolf.com.
   13. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE / DESIGN CRITERIA

A. All electrical appliances shall be UL-approved, listed, and labeled.
B. Energy Ratings: Provide appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information per the FTC Appliance Labeling Rule.
   1. Appliances shall be certified under the ENERGY STAR product labeling program.
C. All appliances must meet applicable State and federal accessibility standards.

2.03 KITCHEN APPLIANCES

A. Refrigerator / Freezer: Free-standing, bottom-mounted freezer, and frost-free.
   1. Capacity: Total minimum storage of 25.4 cubic ft; minimum 35 percent freezer capacity.
   2. Energy Usage: ENERGY STAR certified; minimum 20 percent more energy efficient than energy efficiency standards set by U.S. Department of Energy (DOE).
   3. Features: Include glass shelves, automatic icemaker plumbed to domestic water, and light in freezer compartment.
      a. Four shelves in refrigerator compartment.
      b. Two shelves in freezer compartment.
      c. 2-point front adjustable leveling system.
      d. Electronic temperature controls at front of unit.
   4. Exterior Finish: Stainless steel. Provide Manufacturer's fingerprint-free finish, if available for specified model.
   5. Basis-of-Design Manufacturer / Product: General Electric / _____.
B. Refrigerator - Undercounter: Built-in, undercounter, cycle-defrost.
   1. ADA-Compliant.
   2. Nominal dimensions: 32.0 inches high by 24 inches wide by 24 inches deep.
   3. Manufacturers:
      a. Basis-of-Design Manufacturer / Product: Summit Appliance / _____.
C. Dishwasher: Undercounter.

1. Controls: Fully integrated electronic, top touchpad controls.
2. Cycles: Seven, including glasses, light wash, heavy wash, normal, rinse and hold, and sanitize (NSF Certified).
3. Features: Include stainless interior lining, low-profile installation capable, chip and peel resistant coated racks, rinse aid dispenser, optional water temperature boost, adjustable upper rack, and countdown display with 24-hour delay start.
4. ENERGY STAR rated.
5. Complying to ADA Standards.
6. Leveling System: leveling legs.
7. Electrical Characteristics: 120 volt, 60 Hz, 9.1 Amps.
8. Finish: Stainless steel.
9. Basis-of-Design Manufacturer / Product: General Electric / _____.

2.04 LAUNDRY APPLIANCES

A. Clothes Washer: Front-loading high efficiency model.
   1. Size: 4.5 cubic foot capacity.
   2. Controls: Solid state electronic.
   3. Cycles: Include multiple soil levels for light, normal, and heavily soiled levels.
   4. Electrical Characteristics: 120 volts, 15 amps.
   5. Energy Star rated.
   6. ADA compliant.
   7. Motor Speed: Single-speed.
   8. Features: Include sound insulation, end of cycle signal, and timed flow-through for detergent, bleach, and fabric softener, leveling legs, and vibration control..
   9. Stainless steel drum.
   10. Finish: Painted steel , color as indicated.
   11. Provide matching drawer pedestal.
   12. Manufacturers:
      a. GE Appliances; ____: www.geappliances.com. (Basis of Design
      b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Clothes Dryer: Electric, front-loading, manufacturer's unit in same visual appearance and style as washer.
   1. Size: 7.4 cubic feet capacity; unit overall dimensions to approximate washer.
   2. Controls: Solid state electronic, with electronic moisture-sensing dry control.
   3. Temperature Selections: Five.
   4. Cycles: Including, but not limited to mixed, fluff, extended tumble, timed dry, de-wrinkle, bulky/bedding, normal, permanent press, knit/delicate, air only, and NSF Sanitize.
   5. Features: Include interior light, sound insulation, and end of cycle signal.
   6. Finish: Painted steel , color as indicated.
   7. Manufacturers:
      a. GE Appliances; ____: www.geappliances.com. (Basis of Design)
      b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas with Installer present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, cleanliness and other conditions are per manufacturer's recommendations, and ready to receive work.
         1) Verify utility rough-ins are provided and correctly located.
      b. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Preparation: Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

A. General: Install Appliances according to the Drawings, approved submittals, manufacturer's instructions, and as follows:
   1. Anchor built-in equipment in place, plumb, level, balanced, and in proper relationship to adjacent construction.
   2. Connect appliances to building utility, supply and waste systems as applicable.
   3. Check for and adjust any internal locking bolts to allow for free operation.
   4. Test for proper operation and drainage. Adjust until proper operation is achieved.

B. Defer installation of freestanding equipment until just before Substantial Completion.

3.04 FIELD QUALITY CONTROL

A. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Finish touch-up damaged surface finishes.
   2. Replace damaged material parts or appliances with new if repair not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Remove packing materials from equipment and properly discard.

C. Wash and clean equipment.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 11 40 00
FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 01 Sections, apply to this Section.

1.02 SCOPE

A. Attention is directed to the detailed Item Specifications, which provide for minimum acceptable products. Item Specifications paragraphs may indicate materials or components that exceed the manufacturer's standards and are required for this project.

B. Cooperate and coordinate with others engaged on the project in order that work will progress on schedule.

C. Work to be performed under this Section is shown on Foodservice Equipment Drawings.

D. Install materials furnished under this Section, other than materials that are expressly noted for installation under other Sections. Installation work shall be performed by workmen compatible with those existent on the project site. Equipment shall be of the latest design; new and unused, unless indicated otherwise in the Item Specifications, complete with all standard parts for normal operations and including such accessories or materials as may be required to comply with these Specifications.

E. This Specification is to further describe and supplement the applicable Drawings. What is called for by either the Drawings and/or these Specifications shall be furnished and installed as part of this work. Any questions relative to discrepancies or omissions shall be submitted to the Architect.

F. Provide neatly punched openings or cutouts required to permit passage of plumbing and electrical services by related trades and to accommodate mounted switches and receptacles in the equipment.

G. Work in this Section shall include but shall not be limited to the following:

H. Catalog items of equipment.

I. Fabricated equipment other than catalog items.

J. Plumbing trim consisting of mechanical system components required for standard operation of equipment items such as faucets and waste outlets. Vacuum breakers shall be furnished for equipment where water is introduced less than two inches above flood level.

K. Electrical equipment forming an integral part of equipment items such as electric motors, heating elements, controls, switches, starters, temperature regulators and internal wiring to a control panel or switch, if mounted on the equipment.

L. Sustainable Design Intent: Comply with project requirements intended to achieve a rating, measured and documented according to the LEED Green Building Rating System, of the US Green Building Council.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Finished floor and walls, structural supports for all ceiling supported equipment, acoustical ceilings and related building.

B. Connecting piping, waste lines, traps and vent piping, complete with shut-off valves to all the equipment, and the rough-in for sanitary waste, domestic water, floor drains and plumbing fixtures except those provided under this Section, and related mechanical work.

C. Exhaust ventilating systems complete with blowers, ductwork, hangers, access panels, and insulation between the exhaust collars and the exhaust blowers.

D. External wiring; the mounting and wiring of motor starters, solenoid valves, switches and receptacles not integral with the equipment; mounting and wiring of walk-in refrigerated room ceiling mount light fixtures; wiring of walk-in refrigerated room interior evaporator coils; connecting conduit, and external connections to equipment to the building electrical distribution system.

1.04 SUBMITTALS

A. Submit Shop Drawings for approval in accordance with the General Conditions.

B. Stub-in drawings shall indicate the layout of equipment and dimensioned locations of all services to the equipment.
   1. Hand drawn scale: 1/2 inch = 1’-0”.
   2. CAD drawn scale: 1/4 inch = 1’-0”.
   3. Stubbed services shall include electrical, hot and cold water, floor drains or floor sinks, solid wastes and exhaust collar connections. Point of connection services shall include steam supply, condensate return, gas connection and indirect waste connections. Service dimensions shall include height measured from finish floor.
   4. Electrical and plumbing services shall be indicated and coordinated on the same drawing.
   5. Call-outs for each stub point indicated at the point, or clearly keyed to a schedule on the same drawing.
   6. Special conditions plan shall include all floor recesses, curbs and special wall construction indicated and dimensioned

C. Fabrication drawings shall be furnished for non-catalog items, showing plans, elevations and full construction details with gauges, components, fasteners, erection and connections. Drawings shall be to the minimum scale of 3/4 inch = 1 feet, 0 inch

D. Drawings for custom fabrication, refrigerated rooms, exhaust ventilators, and stub-in drawings shall each be individually submitted in separate drawing packages.

E. Standard items of equipment, not built-in or part of other assemblies shall be submitted for approval in the form of bound catalog cuts. Each cut shall include a clearly marked item number, a listing of all optional accessories and finishes, and connection data.

F. Catalog Cuts shall include letters of approval, under a separate binder, indicating compliance with M.G.L. c. 142 and 248 CMR. Only products and materials that have been listed by the Board as Product-approved shall be used for plumbing and gas fitting work performed in the Commonwealth of Massachusetts.

G. Catalog Cuts shall include operation manuals for all existing foodservice equipment that is scheduled for reuse and that requires gas fitting work performed in the Commonwealth of Massachusetts.

H. Mechanical refrigeration system submittal shall include the firm name and address of the installation contractor and name of the qualified installer.

I. Energy Star - Specified Energy Star rated equipment and appliances shall serve as the standard for all types of equipment and appliances whenever possible. Kitchen Equipment Contractor shall clearly indicate that items are Energy Star rated both on the submittal cover sheet and manufacturer cut sheets.

J. Failure to comply with approved shop drawings shall be cause for rejection of an improperly built assembly.

1.05 SAMPLES

A. If the bidder's proposed equipment fabricator is unknown to the Consultant's office, immediately after award of contract, submit the following samples for selection and approval:

1. Section of table showing edge, bullnose, framing, fasteners, gusset, leg, and foot, all assembled.
2. Drawer assembly (will be returned for use on this project).

B. Work delivered to the job shall match approved samples.

1.06 GUARANTEES AND WARRANTIES

A. New equipment furnished for this facility shall be guaranteed for a period of not less than one calendar year beginning on the date of final acceptance of the work of this Section. In the case of a manufacturer whose standard warranty exceeds this period the longer period shall apply. Self-contained refrigeration units for reach-in refrigerators, freezers, ice cream chests and ice machines shall carry a five-year replacement warranty for the sealed unit. The guarantee shall protect against defective material, design and workmanship.

B. In addition to the guarantee called for under the General Conditions, this Contractor shall further agree that in the event of failure of any system or item of equipment or improper functioning of specified work during the guarantee period, he shall have "on call" competent service personnel available to make the necessary repairs or replacements of specified work promptly at no cost to the Owner. In the event that replacement of an entire item is required, the Owner will have the option of full use of the defective equipment until a replacement has been delivered and completely installed.

C. Furnish manufacturer's warranty for each item of standard equipment and a warranty on fabricated equipment. Submit guarantees and warranties to the Architect in accordance with conditions found in "Demonstration and Operating Instructions" paragraphs, contained in Part 3, this Section.

1.07 REGULATORY AGENCIES

A. Work shall be in accordance with the governing health, building and safety, and fire protection codes and regulations.

B. Standards of the National Sanitation Foundation (NSF) shall serve as guidelines for the work of this Section.

C. Electric equipment and accessories shall conform to the standards of the National Electric Manufacturers Association (NEMA), Underwriters Laboratories, Inc. (UL) or Electrical Testing Station (ETS).

D. Steam generating equipment and accessories shall conform to the standards of the American Society of Mechanical Engineers (ASME).

E. Gas fired equipment and accessories shall conform to the standards of the American Gas Association (AGA) and the American National Standards Institute (ANSI) Z83.11.

F. Energy Star - Specified Energy Star rated equipment and appliances shall serve as the standard for all types of equipment and appliances whenever possible.

G. BOARD OF STATE EXAMINERS OF PLUMBERS AND GAS FITTERS: Board Required Product-approval. Only products and materials that have been listed by the Board as Product-approved shall be used for plumbing and gas-fitting work performed in the Commonwealth and governed by M.G.L. c. 142 and 248 CMR.

1.08 EQUALITY OF MATERIALS AND EQUIPMENT

A. The base bid shall contain no substitutions to these drawings or specifications. Bidders may offer substitute equipment in a separate proposal, indicating the proposed model and sum to be added or deducted if the alternate item is accepted by the Owner. Each line item shall include delivery, installation and taxes. Decisions to accept or reject a piece of equipment shall be made by the Owner, and all decisions shall be final.

PART 2 - PRODUCTS

2.01 MATERIALS AND FINISHES

A. General
   1. Metals shall be free from defects impairing strength, durability or appearance, made of new materials with structural properties to withstand strains and stresses to which normally subject.
   2. Stock materials, patterns, products and methods of fabrication shall be approved provided that they conform to the requirements specified under Item Specifications.

B. Stainless Steel
   1. Stainless steel shall be non-magnetic corrosion resistant chromium-nickel steel, Type 302 or 304 (18-8 Alloy), polished to a Number 4 finish where exposed, unless otherwise noted. Minimum gauges shall be as specified under Item Specifications.

C. Galvanized (Galvannealed) Steel
   1. Galvannealed steel shall be commercial quality with tight coat of zinc galvanizing metal applied to a soft steel sheet, subsequently passed through a 1200 degree F. oven, resulting in a spangle free paintable surface. Minimum gauges shall be as specified under Item Specifications.

D. Plastic Laminate Materials
   1. The laminate facing shall be GP-50, .050 inch thick, general purpose, high pressure, decorative plastic laminate that meets or exceeds the requirements of NEMA Publication LD3-1985, and NSF Standard 35. The plastic laminate exposed surfaces shall be provided in accordance with the specified manufacturer, finish and color. Balancing sheet shall be backing grade GP-28 in matching color at semi-exposed and BK-20 unfinished where hidden.
   2. Plastic laminate covered surfaces shall be factory fabricated with 3/4 inch thick core having plastic laminate facing on both faces and all edges, laminated with waterproof glue under pressure in accordance with the plastic laminate manufacturer's specifications.
   3. The core shall be medium density phenolic resin particleboard conforming to ANSI A208.1, Type 2-M-2, 45 pound per cubic foot density minimum.
   4. Provide veneer core plywood or solid hardwood edge banding for doors and vertical dividers or panels where hardware is attached to casework.
   5. Hinges shall be articulated, spring loaded type equal to Grass CST65-170-F or Stanley, with quantity adequate to support the door without deformation. Do not provide handles on plastic laminate clad doors.

2.02 CONSTRUCTION

A. General
   1. Flat metal work items of equipment, such as tables, sinks, or counter tops, and other non-catalog items described under Item Specifications, shall be manufactured by a food service equipment fabricator who has the plant, personnel and engineering facilities to properly design, detail and manufacture high quality food service equipment.
   2. The equipment fabricator shall be subject to the approval of the Architect, Owner and Consultant. Refer to Paragraph 1.05, Samples.
   3. Fabricated foodservice equipment shall be manufactured by one manufacturer, of uniform design, material and finish.
   4. Equipment shall conform to the applicable requirements of current Federal, State, and Local Codes and Regulations.

B. Welding
   1. The words "weld", "welded" or "welding" as used in this Section of the Specification shall mean that metal joints shall be continuously welded and the exposed parts ground smooth and polished to match adjoining surfaces. Welding electrodes shall match the material being welded.
   2. Where spot welding is specified, the welds shall be a maximum spacing of three inch on center.
   3. Where tack welding is specified, the pieces welded shall have 1/2 inch minimum lengths of welding material at four inch on center maximum spacing.

C. Grinding, Polishing and Finishing
   1. Exposed welding joints shall be ground flush with the adjoining material and neatly finished to harmonize therewith. Wherever material has been depressed or sunken by a welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surfaces and, if necessary, again welded and ground to eliminate low spots. Ground surfaces shall be polished or buffed to a degree consistent with good workmanship. Coves shall be ground and polished to match adjoining material.
   2. Care shall be exercised in grinding operations to avoid excessive heating of metal and discoloration. Abrasives, wheels, and belts used in grinding stainless steel shall be iron free and shall have not been used on carbon steel. The texture of the final polishing operation shall be uniform and smooth. Grain direction shall be uniform, uni-directional for a total length of material. Cross grains and random polishing are not acceptable.
   3. The general finish of equipment shall be consistent throughout the job. Brake ends shall be free of open texture or orange peel appearance, and where brake work mars the uniform finish of the material, the marks shall be removed by grinding and polishing, and finishing. Sheared edges shall be free of burrs, projections or fins to eliminate all danger of laceration. Mitered or bullnosed corners shall be neatly finished with the underedge of the material neatly ground to a uniform condition and in no case will overlapping material be acceptable. The equipment surfaces, where exposed, shall be finished to a grained Number 4 (satin) finish unless otherwise specified. An exposed surface shall include an inside surface, which is exposed to view when a swinging or sliding door is opened. Underside of shelves need not be satin finish unless otherwise specified.
   4. Excessive distortion caused by welding shall be cause for rejection for that item of equipment.

2.03 BUY-OUT COMPONENTS

A. CASTERS: 5 inch diameter polyurethane tired, swivel, plate or stem mount to suit application, 300 pound capacity, brakes only if specified, NSF approved; Component Hardware C-21-3050 (plate/no brake), C21-3051 (plate/brake) C23-3350 (stem/no brake) or C23-3351 (stem/brake), or equal by Kason, or PDI Atlanta.

B. COUNTER LEGS: Stainless steel, 6 inch to 7-3/4 inch height adjustment; Component Hardware A72-0811, or A77-5048, or equal by Kason, or PDI Atlanta.

C. DOOR AND DRAWER PULLS: Stainless steel, full grip type with beveled edge, NSF approved for stud mounting in device, in horizontal attitude to meet NSF requirements; Component Hardware P63-1012, or equal by Kason, or PDI Atlanta.

D. DOOR HINGES: Stainless steel, lift off type, swedged knuckle for minimum clearance, nylon bearings; Component Hardware M75-1002 or equal by Kason, or PDI Atlanta.

E. DRAWER PANS: Molded plastic or fiberglass, 20 inch by 20 inch by five inch deep, NSF approved; Component Hardware S80-2020, or equal by Kason, or PDI Atlanta.

F. DRAWER SLIDES: Stainless steel, NSF approved, full extension, 200 pound capacity with stainless steel ball bearing wheels; Component Hardware S-52 series, or equal by Kason, or PDI Atlanta.

G. FAUCET SETS, DECK MOUNTED: Chrome plated cast bronze with 1/2 inch IPS eccentric flanged female inlets on eight inch centers, removable cartridges, lever handles, and aerator tip on swivel nozzle or swivel gooseneck to suit the application; T&S Brass B-0221 (with B-0425-M connection kit) or B-0321-NPL, or equal by Component Hardware, Chicago, or Fisher.

H. FAUCET SETS, POTWASHING SINK: Chrome plated cast bronze with removable cartridges, 3/4 inch passages, eccentric flanged female inlets on eight inch centers with LL street EL inlets with locknuts, four prong handles, 12 inch swing spout; T&S Brass B-0290 or equal by Component Hardware, Chicago, or Fisher.

I. FAUCET SETS, SPLASH MOUNTED: Chrome plated cast bronze with 1/2 inch IPS eccentric flanged female inlets on 8 inch centers, removable cartridges, lever handles, and aerator tip on 12 inch swing spout; T&S Brass, B-0231-CC or equal by Component Hardware, Chicago, or Fisher. Provide each with a mounting kit.

J. GUSSETS: Stainless steel, stepped side, fully closed, NSF approved, mild steel interior reinforcement, wide flange for welding to framing, set screw anchor for leg; Component Hardware A20-0206C, or equal by Kason, or PDI Atlanta.

K. LEG AND BULLET FOOT ASSEMBLIES: Stainless steel tubing, 16 gauge, number 4 finish, adjustable bullet foot with minimum of 3 inch vertical travel, 2,000 pound capacity, top designed for mounting in gusset, length to suit application; Component Hardware A46-6272-C, or equal by Kason, or PDI Atlanta.

L. LEG AND FLANGED FOOT ASSEMBLIES: Stainless steel tubing, 16 gauge, number 4 finish, adjustable bullet foot with 3-1/2 inch diameter flange and two holes for securing to floor, minimum of three inch vertical travel, 2,000 pound capacity, top designed for mounting in gusset, length to suit application; Component Hardware A46-4272-C, or equal by Kason, or PDI Atlanta.

M. NUTS: Zinc plated "Pal Nuts" with integral cap and lockwasher; Component Hardware Q-34-1024 or equal by Kason, or PDI Atlanta.

N. SEALANT: Sealant for sealing equipment to walls or filling crevices between components. All materials listed below that are used in the building interior must not exceed the following requirements:
   1. South Coast Air Quality Management District (SCAQMD) Rule #1168
   2. For interior adhesives and sealants applied within the weatherproof barrier, submit a printed statement of VOC content.

O. SOUND DEADENING BASINS: Component Hardware Q75-1366 or equal by Kason, or PDI Atlanta.

P. SOUND DEADENING TOPS AND SHELVES: Component Hardware Q85-5225, or equal by Kason, or PDI Atlanta, "Tacky Tape" installed between all channel or angle reinforced tops, drainboards or undershelves.

Q. WASTE OUTLETS, CRUMB CUP: Stainless steel body, removable crumb cup stopper, gasket, coupling nut and sealing washer, 1-1/2 inch IPS, and optional four inch long nickel plated brass tailpiece with gasket; Component Hardware E38-1010, or equal by Kason, or PDI Atlanta.

R. WASTE OUTLETS, LEVER OPERATED: Cast stainless steel rotary type with 1-1/2 inch NPS and two inch NPS threads, and removable beehive crumb-cup; Component Hardware DSS-8000 or equal by Component Hardware, Chicago, or Fisher.

S. WELD STUDS: Copper flashed steel with 10-24 threads, length to suit; Component Hardware Q-36, or equal by Kason, or PDI Atlanta.

T. GFCI RECEPTACLES: Pass & Seymour 2095-W, 115 volt, 20 amp GFCI Duplex Receptacle or equal.

2.04 FABRICATED COMPONENTS

A. Box Type Cabinet Construction
   1. Sheet metal cabinet bases of box type construction shall be fabricated without general interior framing. Structural strength shall be achieved by the gauge of the metal and the formed angle and channel edges and corners. Vertical sections shall be closed. Cabinet base shall be fabricated of 18 gauge minimum of material specified at Item Specifications. Mount on counter legs or base as specified.
   2. Intermediate shelf shall be fabricated of 16 gauge stainless steel with rear and sides turned up 1-1/2 inch tight to the cabinet sides. The front edge of shelf shall be turned down 1-1/2 inch and in 1/2 inch at 45 degrees and shelf spot welded in place. Reinforce underside with longitudinal 14 gauge channel on the centerline.
   3. Bottom shelf shall be fabricated of 16 gauge stainless steel similar to the intermediate shelf except that the front edge shall be formed into a full width 1-1/2 inch by four inch welded in boxed channel. Rear edge shall be fitted with a full width channel. Underside shall be reinforced.

B. Counters and Drainboards
   1. Counters, table tops and drainboards shall be 14 gauge stainless steel, of NSF construction, with edges per Item Specifications. Metal tops shall be made of the largest pieces available and shall appear as one piece with all field and shop joints reinforced and welded, ground and polished. Short pieces of metal will not be acceptable. Counter bends shall be not less than 1/8 inch radius. Wherever a fixture has a waste or drain outlet, the surface shall pitch toward the outlet.
   2. Counters, table tops and drainboards shall be reinforced with channel or angle frame as specified in the Item Specifications. Framing shall be secured to the underside with sound deadening material sandwiched between the surfaces, weld studs, and nuts.
   3. Wherever bolts or screws are welded to the underside of trim or tops, neatly finish the reverse side of the weld uniform with the adjoining surface of the trim or top. Depressions at these points will not be acceptable. Raise dimples and depressions by peening, or heating and shrinking, and grind and polish to present a flat surface.

C. Crossrails
   1. Crossrails shall be not less than 1-1/4 inch outside diameter 16 gauge stainless steel tubing welded, ground and polished to a Number 4 finish. Crossrails shall be welded to legs at a height of 10 inch above finished floor, and shall extend from left to right between front legs, unless otherwise specified, and from front to back between all legs.

D. Drawer Assembly
   1. Drawer assemblies shall consist of a removable drawer pan set in a removable 16 gauge stainless steel channel shaped drawer support frame with gusset plate reinforced corners.
   2. Support frame shall have double pan front cover consisting of boxed 18 gauge stainless steel outer shell with welded corners, flush mounted recessed stainless steel pull, 20 gauge stainless steel back shell tack welded to outer shell with fiberglass sound deadening between. Drawer shall be provided with rubber bumpers to quiet closing. Support drawer frame on full extension drawer slides.
   3. Drawer shall be suspended from table in a three-sided, 16 gauge stainless steel enclosure with flanged-in bottom edges, banded lower front, flanged-out front side and top edges. All sharp corners shall be broken and any exposed exterior threads of slide mounting bolts shall be provided with solid metal acorn nuts.

4. Component Hardware S91-0020 with thermoplastic pan is considered as equivalent to the above specified construction.

E. Edges
   1. Marine: Bumped up 1/2 inch at 45 degrees and turned down 1-1/2 inch and in 1/2 inch at 45 degrees; corners welded and square.
   2. Raised roll: Coved up and rolled 180 degrees on a 1-1/2 inch diameter with three inch height; corners welded and rounded or coved.
   3. Rolled: Rolled 180 degrees on a 1-1/2 inch diameter; corners welded and bullnosed.
   4. Short (6 inch) splash on counters and tables: Coved up six inch, turned back to wall or equipment one inch and down 1/2 inch; ends welded closed. Secure tight to face of wall with clips unless specified otherwise and seal joint.
   5. Tall (10 inch) splash on preparation sinks, dishtables, counter, and tables: Coved up 8-1/2 inch, turned back to wall or equipment 1-1/2 inch at 45 degrees and down 1/2 inch; ends welded closed. Secure three inch off face of wall with brackets unless specified otherwise.
   6. Turn down: Turn down two inch and in 1/2 inch at 45 degrees; corners welded and square.

F. Framing of Tops, Drainboards, Undershelves
   1. Channel: Reinforce with one inch by four inch by one inch 14 gauge galvannnealed steel channels; stainless steel if exposed to view. Channels shall run front-to-back at all legs and longitudinally on the centerline. Cross and longitudinal members shall be welded into a single assembly at intersections and sharp corners shall be broken. Framing shall be secured to underside of tops with pairs of weld studs. Framing shall be installed maintaining NSF required clearance to adjacent vertical surfaces and edges of top. The following specified angle framing is considered superior to channel framing and may be used in its place.
   2. Angle: 1-1/2 inch by 1-1/2 inch by 1/8 inch perimeter angle frame with crossmembers not over 30 inch on center. Framing shall be secured to top with weld studs, 18 inch on center maximum with three minimum studs on any single face of a table. Perimeter angle frame that is exposed to normal view, shall be stainless steel. Crossmembers and framing not unexposed to normal view shall be iron. Corners of angle frame shall be mitered, or notched and brake formed to form a closed corner. Corner gusset plates used for mounting of leg gussets shall be 1/8 inch thick and sealed to underside of the top. Iron framework joints shall be ground smooth, and shall be painted with a minimum of two coats of aluminum lacquer after degreasing. Framing shall be installed maintaining NSF required clearance to adjacent vertical surfaces and edges of top. Channel framing shall not be considered equal to specified angle framing.
   3. Sound deaden all horizontal framed surfaces with material sandwiched between the framing and the bottom of the surface.

G. Hinged Doors
   1. Hinged doors shall be double pan type stainless steel construction with 18 gauge exterior and 20 gauge interior, welded corners, and 1/2 inch fiberglass insulation for sound deadening. Each door shall be provided with a stainless steel recessed handle, and an adjustable tension door catch equal to Component Hardware M22-2430. Doors shall close against the bottom shelf and flush with body of equipment.
   2. Louvered hinged doors for ventilation shall be fabricated of the same components and provided with a full perimeter three inch wide channel reinforcing frame on the interior face. Remaining face shall be die punched with drip-proof louvers fully utilizing the remaining flat metal or a stainless steel flattened expanded metal grille per Item Specifications.

H. Sinks and Sink Inserts
   1. Unless otherwise specified, sinks including sink inserts built into tops of fixtures, shall be made of 14 gauge stainless steel with all vertical and horizontal corners rounded to a radius of approximately 3/4 inch with the intersections meeting in a spherical section. Sinks shall be integrally welded to fixture tops.
   2. Sinks with two or more compartments shall have full height, one inch thick double wall partitions consisting of two pieces of stainless steel back-to-back so fabricated that each compartment will be a deep bowl with coved corners. Partitions shall be welded in place to the bottom, front and back of the sink with smooth rounded coved corners. Top edges of the partitions shall be continuously welded. The front of the sinks shall consist of a stainless steel smooth, flush apron, same gauge as the sinks. Bottom and rear of partitions shall be closed. Sink dimensions contained in Item Specifications are inside dimensions.
   3. Sinks shall be provided with integral 14 gauge stainless steel drainboards when specified. Drainboards and sink basins shall be pitched toward waste outlets and shall be self draining. The underside of all sink basins shall sound deadened. Sink units shall be provided with an integral splash at walls. Provide the necessary holes for the mounting of faucet sets.

I. Undershelves
   1. Undershelf in an open type table shall be 16 gauge stainless steel unless otherwise noted. Edges shall be turned down 1-1/2 inch and in 1/2 inch at 45 degrees with corners notched out to fit legs to which shelf shall be welded from underside. Line up all edges of shelf with centerline of legs. Reinforce underside with longitudinal 14 gauge channel on the centerline.

J. Wall Brackets
   1. Dish tables, sinks and counters with sinks shall be securely anchored three inch off the face of the wall unless specified otherwise. Brackets shall be "Z" shaped and fabricated of three inch wide, 14 gauge stainless steel. Brackets shall be secured in a vertical attitude to the rear of equipment backsplash with weld studs, and to the wall with appropriate fasteners.
   2. Counters that are specified tight-to-wall shall be secured in a hidden manner with steel clips, and the wall/fixture joint shall be sealed.

K. Wall Shelves
   1. Wall shelves shall be fabricated of 16 gauge stainless steel, size per Item Specifications, with back and ends raised 1-1/2 inch, front edges of ends angled back, all corners broken, and front turned down 1-1/2 inch, and in 1/2 inch at 45 degrees. Shelf corners shall be welded, ground and polished. Mount shelf one inch off face of wall with suitable fasteners on 14 gauge stainless steel flag brackets, 48 inch on center maximum. Flag brackets shall have a web angle of 30 degrees, measured from horizontal.

2.05 ELECTRICAL EQUIPMENT AND WIRING

A. Under this Section, items of equipment having mounted electrical motors, electrical heating units, lighting fixtures, controllers, control stations, switches, receptacles and the like shall be internally wired as specified herein, terminating at a junction box mounted on the equipment and left ready for connection to the building electrical distribution system by the Electrical Contractor. Extra ceiling mount light fixtures for refrigerated rooms shall be delivered to Electrical Contractor for field installation and wiring. Connections to evaporator coils mounted inside refrigerated rooms shall be wired by the Electrical Contractor.

B. Provide openings or cutouts required to accommodate the switches and receptacles in the specified work, and the wiring in conduit from terminal blocks in junction boxes.

C. Electrically operated equipment and fabricator wiring shall conform to the requirements of Underwriter's Laboratories, Inc. Motors over one horsepower shall be equipped with overload protection.

D. Furnish wiring diagrams for equipment as requested by the Architect or Contractor.

2.06 ITEM SPECIFICATIONS

Item 1
MOP SINK & SERVICE FAUCET (BY PC)

Item 2
MOP RACK UTILITY SHELF

Item 3
HOSE REEL ASSEMBLY (35' HOSE WITH SPRAY GUN)

Item 4
No item

Item 5
No item

Item 6
DETERGENT STORAGE CABINET

Item 7
MOBILE SHELVING UNIT, FOUR-TIER

Item 8
FRONT LOAD CLOTHES WASHER

Item 9
FRONT LOAD CLOTHES DRYER

Item 10
No item

Item 11
No item

Item 12
WALK-IN COOLER

Item 13
WALK-IN FREEZER

Item 14a
COOLER CONDENSING UNIT

Item 14b
COOLER EVAPORATOR COIL

Item 14c
FREEZER CONDENSING UNIT

Item 14d
FREEZER EVAPORATOR COIL

Item 15
MOBILE SHELVING UNIT, FOUR-TIER
Quantity - 23

Item 16
DUNNAGE RACK, MOBILE
Quantity - Two

Item 17
STORAGE SHELVING, FIVE-TIER
Quantity - 15

Item 18
DUNNAGE RACK
Quantity - Three

Item 19
UTILITY CART
Quantity - Seven

Item 20
No item

Item 21
No item

Item 22
AUTOMATIC SLICER

Item 23
MOBILE EQUIPMENT STAND

Item 24
WASTE BARREL (BY OWNER)
Quantity - Two

Item 25
PREP TABLE WITH SINKS

Item 26
WALL SHELF

Item 27
MANUAL CAN OPENER

Item 28
HAND SINK
Quantity - Four

Item 29
WASTE BIN (BY OWNER)
Quantity - Four

Item 30
PAN RACK, MOBILE
Quantity - Four

Item 31
No item

Item 32
No item

Item 33
FIRE SUPPRESSION SYSTEM

Item 34
DEMAND CONTROL VENTILATION SYSTEM

Item 34a
VENTILATOR CONTROL INTERFACE SCREEN

Item 34b
ROOM TEMPERATURE SENSOR

Item 35
EXHAUST VENTILATOR

Item 36
EXHAUST VENTILATOR

Item 37
UTILITY DISTRIBUTION SYSTEM (UDS)

Item 38
DOUBLE CONVECTION OVEN

Item 39
TEN-PAN CONVECTION STEAMER

Item 40
WATER FILTER ASSEMBLY

Item 41
FORTY-GALLON TILTING BRAINING PAN

Item 42
SIX-BURNER RANGE WITH OVEN

Item 43
DOUBLE COMBINATION OVEN

Item 44
DOUBLE COMBINATION OVEN

Item 45
WATER FILTER ASSEMBLY
Quantity - Two

Item 46
FLOOR PAN & GRATE

Item 47
No item

Item 48
No item

Item 49
MOBILE HOT FOOD HOLDING CABINET

Item 50
MOBILE WORK TABLE

Item 51
WORK TABLE WITH OVERSHELF

Item 52
WORK TABLE

Item 53
COOK'S WORK TABLE WITH SINK AND OVERSHELF

Item 54
WORK TABLE

Item 55
FOOD PROCESSOR

Item 56
No item

Item 57
No item

Item 58
REFRIGERATOR, PASS-THRU

Item 59
HOT FOOD HOLDING CABINET, PASS-THRU

Item 60
MOBILE WORK TABLE

Item 61
REFRIGERATOR, PASS-THRU

Item 63
REFRIGERATOR, WORKTOP

Item 64
GRIDDLE WITH MOBILE STAND

Item 65
EXHAUST VENTILATOR

Item 66
DEMAND CONTROL VENTILATION SYSTEM

Item 66a
VENTILATOR CONTROL INTERFACE SCREEN

Item 66b
ROOM TEMPERATURE SENSOR

Item 67
FIRE SUPPRESSION SYSTEM

Item 68
No item

Item 69
No item

Item 70
SERVING COUNTER

Item 70a
SELF-SERVICE GLASS DISPLAY CASE

Item 71
REFRIGERATED COLD PAN, DROP-IN

Item 72
SERVING COUNTER

Item 72a
FULL SERVICE GLASS FOOD PROTECTOR

Item 73
FILL FAUCET

Item 74a
HOT FOOD WELLS, DROP-IN (MOUNTED IN GROUP OF TWO)
Quantity - Two

Item 74b
HOT FOOD WELLS, DROP-IN (MOUNTED IN GROUP OF THREE)
Quantity - Three

Item 75
SERVING COUNTER

Item 75a
SELF-SERVICE GLASS DISPLAY CASE
Quantity - Two

Item 76
REFRIGERATED COLD PAN, DROP-IN
Quantity - Two

Item 77
SERVING COUNTER

Item 77a
FULL SERVICE GLASS FOOD PROTECTOR

Item 78
FILL FAUCET

Item 79a
HOT FOOD WELLS, DROP-IN (MOUNTED IN GROUP OF TWO)
Quantity - Two

Item 79b
HOT FOOD WELLS, DROP-IN (MOUNTED IN GROUP OF THREE)
Quantity - Three

Item 80
SERVING COUNTER

Item 80a
SELF-SERVICE GLASS DISPLAY CASE

Item 81
REFRIGERATED COLD PAN, DROP-IN

Item 82
No item

Item 83
No item

Item 84
MILK COOLER
Quantity - Two

Item 85
STORAGE SHELVING, FIVE-TIER
Quantity - Four

Item 86
MOBILE CASHIER STAND
Quantity - Four

Item 87
CASHIER TERMINAL (BY OWNER)
Quantity - Four

Item 88
MOBILE CONDIMENT COUNTER
Quantity - Two

Item 89
PORTABLE TRAFFIC STANCHIONS (SET OF THREE)
Quantity - Four

Item 91
No item

Item 92
No item

Item 93
SOILED WARE TABLE WITH INTEGRAL PASS-THRU FRAME

Item 94
ROLL-DOWN SHUTTER

Item 95
HOSE REEL ASSEMBLY

Item 96
WAREWASHER, CONVEYOR TYPE, VENTLESS

Item 97
WATER FILTER ASSEMBLY, WASWASHER

Item 98
CLEAN WARE TABLE

Item 99
MOBILE SHELVING UNIT, FOUR-TIER
Quantity - Four

Item 100
THREE-COMPARTMENT SINK

Item 101
WALL SHELF

Item 102
EYE/FACE WASH, WALL MOUNTED

PART 3 - EXECUTION

3.01 SANITATION REQUIREMENTS

A. Equipment specified herein shall be fabricated to conform to the "Food Service Equipment Standards" of the National Sanitation Foundation prepared by the Committee on Food Service Standards, and published by the National Sanitation Foundation, Ann Arbor, Michigan. Any differences of opinion on sanitation will be referred to the State Department of Health for a ruling.

B. Equipment shall be installed in accordance with the manufacturer's instructions and the best practices of the food service industry, with careful attention to eliminating all cracks, crevices and concealed spaces in wet areas that would be difficult to clean or keep free of vermin and soil.

3.02 EXAMINATION AND ACCEPTANCE

A. Determine whether the General Contractor will furnish and provide temporary power and light, openings and storage space to permit scheduled delivery of equipment. Verify water pressure and provide necessary reducing valves.

B. Examine space in which specified work is to be installed to assure that conditions are satisfactory for the installation of specified work. Report in writing to the Architect, any deficiency in the work of other contractors affecting specified work. Commencement of specified work will be construed as acceptance of space conditions.

C. Obtain and verify all measurements and conditions on the job, and assume responsibility in respect to same.

D. Inspect flooring and raised concrete bases, wall finishes, painting, ceiling installation and all related work for readiness to commence installation of foodservice equipment. Verify the existence of required mechanical and electrical rough-ins.

3.03 CLEANING UP

A. Debris and surplus materials resulting from installation work shall be removed promptly as work progresses, to a location indicated by the General Contractor.

B. Following completion, and before final acceptance by the Owner, clean finished surfaces in accordance with the manufacturer's instructions, and leave specified work free of imperfections.

3.04 DEMONSTRATION AND OPERATING INSTRUCTIONS

A. Before final acceptance, and by appointment with the Owner and his representatives, completely demonstrate with power, the correct operation of each new item of operating equipment.

B. Prior to the demonstration, turn on all mechanical and electrical foodservice equipment. Test for leaks, poor connections, and inadequate or faulty performance and correct if necessary. Adjust for proper operation. Thermostatically controlled equipment and equipment with automatic features shall be operated for a sufficient length of time with proper testing equipment to prove controls are functioning as intended. Recalibrate thermostats if necessary.

C. Provide Architect or Consultant with a loose leaf bound manual of operating data and maintenance instructions containing complete description, wiring diagrams, operating data, maintenance requirements and other information pertaining to the proper operation and upkeep of the various items of electrical or mechanical equipment. Include names, addresses and telephone numbers of authorized service agencies for all items. Arrange all material in alphabetical order by Manufacturer. Provide with a list of equipment to include make, model, and serial number where applicable. Book shall be turned over to Owner after review and approval.

D. Submit guarantees and warranties to the Architect in the above specified manual with all warranty cards completed and becoming effective at the time the equipment was satisfactorily demonstrated.

3.05 PROTECTION OF WORK

A. Protect specified work from damage during transportation to the project site, storage at the site, during installation, and after completion until acceptance by the Owner.

B. Protect adjacent work under other contracts during installation until completion of specified work. After completion, the contractor for other work shall be responsible for the protection of his work until acceptance by the Owner.

C. Damaged work as determined by the Architect, shall be repaired or replaced as determined by the Architect.

END OF SECTION

SECTION 11 52 13
PROJECTION SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following Projection Screen work:
   1. Electrically operated front projection screen assemblies and controls.
   2. Screen case, brackets, fasteners, and other accessories required for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.
B. NFPA. National Fire Protection Association; www.nfpa.org.
C. UL. Underwriters Laboratories; www.ul.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
C. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
D. NFPA 70 - National Electrical Code.
E. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
F. SMPTE RP 94 - Gain Determination of Front Projection Screens.
G. UL (DIR) - Online Certifications Directory.

1.04 DEFINITIONS

A. Gain of Front-Projection Screens: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined by SMPTE RP 94.
B. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Installation methods.
      d. Wiring diagrams for motor operators and actuators, and controls and switches.
   2. Shop Drawings: For custom installations, indicate dimensions, verified field measurements, mounting details, and interface with adjacent construction.
   3. Samples: For screen fabrics, submit three samples 4 by 4 inch in size.
   4. Samples: For case and frame finishes, submit two samples 6 by 6 inch in size, illustrating color and texture of finish.
   5. Installer's Qualification Statement.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project

Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.

2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals

1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain projection screens from single manufacturer. Obtain accessories, including necessary mounting hardware, from screen manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Installer Qualifications: Experienced in installation of the work of this Section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations Section 01 60 00 - Product Requirements, and as follows:

B. Deliver projection screens to project site in manufacturer's original unopened packaging, and inspect for damage and proper size before accepting delivery.

C. Store in a protected, clean, dry area with temperature maintained above 50 degrees F, and stack in accordance with manufacturer's recommendations.

D. Acclimate screens to building temperatures for 24 hours prior to installation, in accordance with manufacturer's recommendations.

1.08 FIELD CONDITIONS

A. Maintain interior of building between 60 degrees F and 75 degrees F during and after installation of projection screens.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements and submittal instructions.

1. Projection Screen: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by an authorized company official.

PART 2 PRODUCTS

2.01 GENERAL

A. Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation. Provide units that are listed and labeled as an assembly by UL (DIR) or another testing and inspecting agency acceptable to authorities having jurisdiction.

2.02 FRONT PROJECTION SCREENS

A. Manufacturers:

1. Motorized Projection Screens: Subject to compliance with these specifications, provide products of one of the following:
   a. Da-Lite Screen Company; Professional Electrol: www.da-lite.com.
   b. Draper, Inc; Premier: www.draperinc.com. (Basis of Design)
   c. Stewart Filmscreen Corporation: www.stewartfilmscreen.com.

d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2. Motorized Projection Screens: Subject to compliance with these specifications, provide products of one of the following:
   a. Bretford: www.bretford.com.
   b. Da-Lite Screen Company; Tensioned Large Advantage Deluxe Electrol: www.da-lite.com.
   c. Draper, Inc; Access Series V: www.draperinc.com. (Basis of Design)
   d. Stewart Filmscreen Corporation: www.stewartfilmscreen.com.
   e. BEI Audio-visual Products; www.beionline.com.
   f. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Front Projection Screens: Factory assembled unless otherwise indicated.
   1. Located in Cafeteria: Motorized, matte light diffusing fabric screen, horizontally tensioned, wall mounted.
      a. Screen Size and Format: 272 inches diagonal; 16:10 aspect ratio.
      b. Basis of Design Product: Da-Lite Tensioned Advantage Electrol.
   2. Located in Gymnasium: Motorized, matte light diffusing fabric screen, horizontally tensioned, wall mounted.
      a. Screen Size and Format: 272 inches diagonal; 16:10 aspect ratio.
      b. Basis of Design Product: Da-Lite Tensioned Large Advantage Deluxe Electrol.

C. Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
   1. Material: Matte white vinyl on fiberglass backing, with nominal gain of 1.0 over viewing angle not less than 70 degrees from axis, horizontally and vertically.
   2. Seams: No seams permitted in fabric up to 96 inch high by 72 inch wide.
      a. Where length of screen indicated exceeds maximum length produced without seams in material specified, provide screen with horizontal seam placed as follows:
         1) At top of screen at juncture between extra drop length and viewing surface.
   3. Mildew-Resistance Rating: 0 or 1 when tested according to ASTM G21.
   4. Flame Resistance: Passes NFPA 701.
   5. Flame-Spread Index: Not greater than 75 when tested according to ASTM E84.

D. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8-inch- diameter metal rod with ends of rod protected by plastic caps.

E. Masking Borders: Black, on four sides.

F. Extra Drops: Black; of dimensions needed to locate bottom of projecting surface 36 inches above finish floor.

G. Exposed Screen Cases: at locations indicated on Drawings: Steel, with integral roller brackets.
   1. Finish: Baked enamel.
   2. Color: White.
   3. End Caps: Steel; finished to match case.
   4. Mounting: Wall and ceiling, as indicated on drawings, with brackets.

H. Concealed-in-Ceiling Screen Cases at locations indicated on Drawings: Aluminum, with integral roller brackets.
   1. Door Slat: Self trim; self-closing and -opening.

2. Case Finish: Manufacturer's standard powder coat or enamel.
3. Case Color: Black.
4. End Caps: Aluminum; finished to match case.
5. Electrically-Operated Screens: 1-1/2 inch aluminum door roller.
6. Case: UL plenum rated case.

I. Electrically-Operated Screens:
1. Top edge securely anchored to rigid metal roller.
2. Provide metal or metal-lined wiring compartment on units with motor in roller.
3. Roller: Steel, 5-3/4 inch in diameter, with locking device.
4. Vertical Tensioning: Screen fabric weighted at bottom with steel bar and plastic end caps.
5. Horizontal Tensioning: Tab-guided cable system.

J. Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings.

2.03 ELECTRICAL COMPONENTS

A. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.

B. Motors: Direct drive, 110 V, 60 Hz.
1. Screen Motor: Instant-reversing motor of size and capacity recommended by screen manufacturer, mounted inside roller; three wire with ground; quick reverse type and lifetime lubricated; equipped with thermal overload cut-off, internal junction box, electric brake, and pre-set accessible limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting.
a. Electrical Characteristics: 1.2 amps.
b. Motor mounted on sound absorber.
2. Door and Adjustable Masking Motor: Mounted inside roller; three wire with ground; quick reverse type; equipped with thermal overload cut-off.
a. Electrical Characteristics: 1.2 amps.
b. Motor mounted on sound absorber.

C. Controls: Three (3) position control switch with plate.
1. Provide one control switch for each screen.
2. Provide power supply for low-voltage systems if required.
3. Provide ability to interlock screen motor controls with projector via interface with audio visual controls.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
a. Verify that substrate is finished and ready to accept screen installation.
b. Verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, cleanliness, and other conditions are per manufacturer's recommendations, and ready to receive work.
c. Verify that openings for recessed screens are correctly sized.
d. Verify type and location of electrical connections.

e. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.02 PREPARATION

A. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, fire suppression, and registers and grilles.

3.03 INSTALLATION

A. General: Install Projection Screens according to the Drawings, approved submittals, manufacturer's instructions, and as follows:
   1. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.
   2. Do not field cut screens.
   3. Install screens in mountings as specified and as indicated on Drawings. Unless otherwise indicated on Drawings, install with bottom of screen case at 90 inches above floor.
   4. Handle rigid screen materials with care to avoid damage. Use equipment only on uncoated side.
   5. Install plumb and level.
   6. Coordinate electrically operated screens ready for connection to power and control systems by Electrical Trade Contractor.
   7. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.
   8. Test and adjust electrical screens for proper working condition.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   1. Ensure that the screen is level above viewing surface plumb when extended.
   2. Correct deficiencies.
   3. Test motorized projection screens to verify screen, controls, limit switches, closure, and other operating components are functional.

B. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for substantial completion.
   1. Finish touch up damaged surface finishes.
   2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.05 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.06 PROTECTION

A. Protect installed work from subsequent construction operations until date of Final Completion or Owner occupancy whichever occurs first.

END OF SECTION

SECTION 11 61 43
STAGE CURTAINS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following stage curtains and rigging:
   1. Main front dead hung traveler curtain, battens, track, fixed valance above main, and drapery.
   2. Rear dead hung traveler curtain, battens, tracks, and drapery.
   3. Dead hung side curtains, battens, and drapery.
   4. Light structural steel framing for the attachment of theater drapery tracks to structural steel framing, to fit project conditions and provide a complete installation.
   5. Accessories for a complete system with all necessary hardware.

1.02 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
   1. ASTM. American Society for Testing and Materials: www.astm.org.
      a. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
      b. ASTM A391/A391M - Standard Specification for Grade 80 Alloy Steel Chain.
      c. ASTM A413/A413M - Standard Specification for Carbon Steel Chain.
      d. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   2. AWS. American Welding Society: aws.org.
      a. AWS D1.1/D1.1M - Structural Welding Code - Steel.
   3. ESTA. Entertainment Services and Technology Association; www.esta.org.
   4. FM. Factory Mutual; www.fmglobal.com.
      a. FM (AG) - FM Approval Guide.
   5. ITS. Intertek; www.intertek.com.
      a. ITS (DIR) - Directory of Listed Products.
      b. MGL, Part 1, Title II, Chapter 21A, Section 28 - Protection from Harmful Flame Retardants.
   6. NFPA. National Fire Protection Association; www.nfpa.org.
      a. NFPA 70 - National Electrical Code.
      b. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
   7. OSHA. Occupational Safety and Health Administration; www.osha.gov.
   8. UL. Underwriters Laboratories; www.ul.org.
      a. UL (DIR) - Online Certifications Directory.
   9. USITT. United States Institute for Theatre Technology; www.usitt.org.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals:
   1. Product Data: Submit product data describing each component of the installation.
      a. Stage Curtains: Provide information on type of curtain, weight, location for use on project, and documentation of compliance with flame retardancy requirements.

b. Tracks: Provide capacity of each curtain track to support curtain weight and control curtain operation.

2. Shop Drawings: Indicate all dimensions, details of installation, relation to adjoining work, fastenings, anchorage.
   a. Submit floor plans, elevations, sections, attachment details of curtains and operating clearances.
   b. Submit fabric assembly and support details.
   c. Submit documentation indicating load capacity of each batten, track, attachment, and rigging components.
   d. Submit attachment locations for grand drape, backdrop curtain, and proscenium curtain, and corresponding loads imposed on structure.
   e. Submit locations of equipment components, switches, and controls; identify between manufacturer installed and field installed wiring.
   f. Submit wiring diagrams for power, signal, and control wiring.
3. Selection Samples: Submit three sets of fabric samples of each type of stage curtain indicated that includes full range of colors, textures, and patterns available, along with two 12 inch square fabric samples, in any color, of each fabric type and seam.
4. Certificates: Documentation that fabrics pass specified flame retardant testing.
5. Delegated Design Data: Indicate stage curtain system structural attachments, including analysis data signed and sealed by qualified designer responsible for their preparation.
6. Designer's Qualification Statement.
7. Installer's Qualification Statement.
8. Specimen warranties.

C. Sustainability Submittals
1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data: For stage curtains and rigging operations.
   a. Include manufacturer's cleaning instructions for drapery.
3. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
4. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
   a. See Section 01 60 00 - Product Requirements, for additional provisions.
   b. Extra Stock of Stage Curtain Materials: Five percentof each kind of fabric provided for project.

1.04 QUALITY ASSURANCE

A. Designer Qualifications: Perform design of track support system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Massachusetts.

B. Protection From Harmful Flame Retardants:

1. Products shall comply with MGL, Part 1, Title II, Chapter 21A, Section 28.

C. Installer Qualifications: The rigging contractor shall be an approved rigging manufacturer or shall have been an authorized representative or dealer of the manufacturer for a minimum of five years, involved in installing stage rigging systems for a period of five years or more, and shall have completed at least ten installations of this type and scope. The Architect will be the final judge of the suitability of experience.

1. Approved Rigging Contractors: The Theatrical Rigging Contractor shall be one of the following accepted firms:
   a. High Output, Inc.
      184 Everett Street
      Boston, MA 02134
      Tel: (617) 787 4747 or (800) 787 4747
      Fax: (617) 787 4666
   b. J.R. Clancy, Inc. (Basis of Design)
      7041 Interstate Island Road
      Syracuse, NY 13209
      Tel: (315) 451 3440 or (800) 836 1885
      Fax: (315) 451 1766
   c. Limelight Productions, Inc.
      471 Pleasant St.
      Lee, MA. 02138
      Tel: (413) 243-4950
      Fax: (413) 243-4993
2. Requirements for Approval: Other contractors seeking acceptance must submit the following information at least one week prior to the general bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the rigging contractor from consideration of approval.
   a. This Equipment Contractor shall have been involved in installing theater rigging for a period of five years or more and shall have completed at least 10 installations of this type and scope. The Architect and Owner will be the final judge of the suitability of experience.
   b. A listing of five equivalent installations including:
      1) Name, address and telephone number of projects' Owners.
      2) Name, address and telephone number of projects' Architects.
   c. A brief written description of the rigging contractor's operation including facilities, financial capabilities and a description of key personnel.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver materials until building is closed in and finish painting is completed.

B. Store materials per manufacturer's instructions.

C. Protect all materials from weather damage at all times.

1.06 FIELD CONDITIONS

A. Ambient Conditions: Do not install stage curtains until spaces are fully enclosed and watertight, and the following:

1. Wet work in adjacent areas is complete and surfaces are dry.
2. Work at and above ceiling level has been completed.
3. Ambient temperatures and humidity of adjacent areas are maintained at levels when occupied for intended use.

B. Field Measurements: Confirm supporting structural element locations and adjacent construction for stage curtains and rigging, and complete field measurements prior to fabrication and include these dimensions on shop drawings.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer shall provide their standard warranties for work under this Section. However, such warranties shall be in addition to and not in lieu of all other liabilities which manufacturers and Contractor may have by law or by other provisions of the Contract Documents.

C. Correct defective Work within a two year period after Date of Substantial Completion.

1. Defective Work includes, but is not limited to, stage curtain support and rigging that is not operating properly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Stage Curtain Fabrics:

1. Beck Studios Inc: www.beckstudios.net.
2. Fred Krieger & Company: www.fredkriegerfabrics.com.
3. KM Fabrics, Inc: www.kmfabrics.com. (Basis of Design for stage curtains)
4. Limelight Productions; www.limelightproductions.com.
5. LuXout Stage Curtains: www.luxout.com.
6. Rose Brand; www.rosebrand.com.
7. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Stage Curtain Track Systems:

1. Automatic Devices Company: www.adctracks.com. (Basis of Design for stage tracks)
2. J.R. Clancy, Inc.: www.jrclancy.com.. (Basis of Design for stage rigging equipment, head blocks, and loft blocks.)
3. Tru-Roll Theatrical Rigging & Hardware; www.truroll.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 PERFORMANCE REQUIREMENTS

A. In order to establish minimum standards of safety, the following factors shall be used.

1. Cables and fittings: 8 Safety Factor.
2. Cable bending ratio: Sheave is 30 times diameter of cable.
3. Maximum fleet angle: 1-1/2 degrees.
4. Steel: 1/5 of yield.
5. Bearings: Two times required load at full speed for 2000 hours.
6. Bolts: Grade 5 or better, plated.

B. Materials: All materials used in this project shall be new, unused and of the latest design.

C. Fabrication:

1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall not be any burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
2. All moving parts shall have specified tolerances. Sheaves shall run plumb and true and shall not scrape housings.

3. All equipment shall be built and installed to facilitate future maintenance and replacement.

D. Stage Curtain Systems Design: Engage qualified designer to develop design of stage curtain system, including comprehensive project specific analysis of necessary structural system attachments in compliance with performance requirements.

E. Structural Performance: Ensure attachment of stage curtain system to structure will withstand material weight and operational loads applicable for this project and is in compliance with local building codes and authorities having jurisdiction.
   1. Design Loads: Weight of stage curtains and track system.

F. Fire-Test Characteristics: Stage curtain fabrics shall comply with NFPA 701 Test Method 1 or Test Method 2 flame propagation fire test requirements, conducted by an authorized testing agency listed by UL (DIR), ITS (DIR), or FM (AG) and acceptable to Authorities Having Jurisdiction.
   1. Stage curtain fabrics shall be inherently flame retardant. Fire retarded treated fabrics will not be allowed.
   2. Permanently attach label to fabric of each curtain assembly indicating fabric treatment as follows:
      a. Inherently Flame Retardant (IFR), fibers/yarns that are non-combustible for life of fabric.

G. Electrical Components: Devices that are listed and labeled in compliance with NFPA 70, by a qualified testing agency, and marked for designated application.

H. Omissions: Where dimensions and loading capacities have been omitted from this Specification, they are to be determined in accordance with accepted ESTA and USITT Rigging Standards and the guidelines in this Section. In no way shall the rigging contractor be relieved of the primary responsibility to provide a safe, fully functional system.

2.03 STAGE CURTAIN FABRICS

A. Provide curtains of matching fabric and color from single dye lot, and when size and quantity of curtains exceeds maximum dye lot size, provide curtain or adjacent pair of curtains from only one dye lot, and arrange curtain dye lots to minimize exposure of any differences.

B. Type A - Weighing at least 25 ounces/linear yard, inherently flame-retardant synthetic fabric.
   1. Application: Main stage curtain, and fixed valance above main stage curtain.
   2. Color: As selected by Architect from manufacturer's full range.
   3. Texture: As selected by Architect from manufacturer's full range.
   4. Pattern: Solid.
   5. Basis of Design Fabric: KM Fabrics Inc.; Prestige: kmfabrics.com, or equivalent acceptable to Architect.

C. Type B - Weighing at least 25 ounces/linear yard, inherently flame retardant synthetic fabric.
   1. Application: Rear curtain.
   2. Color: Black.
   3. Texture: As selected by Architect from manufacturer's full range.
   4. Pattern: Solid.
   5. Basis of Design Fabric: [TO BE DETERMINED], or equivalent acceptable to Architect.

2.04 LININGS

A. Light-Weight Polyester Lining: Weighing at least 10 ounces/linear yard, 100 percent polyester fabric; 72 inch minimum width.
   1. Color: Black.
   2. Basis of Design Product: [TO BE DETERMINED] or Architect approved equivalent.

2.05 CURTAIN TRACK

A. Steel Track: Track shall be of galvanized construction, in compliance with ASTM A653/A653M, with G60 coating designation; entirely enclosed except for the slot in the bottom; black paint finish; including support and operation accessories.
   1. Thickness: As recommended by manufacturer for curtain loads and operation.
      a. Heavy-Duty: 14-gauge, 0.0747-inch minimum thickness.
   2. Basis of Design Product: J.R. Clancy No. 24-280 track assembly or Architect approved equivalent

B. Each section of track less than 20 feet shall be in one continuous piece. Splice clamps shall be permitted for section length over 20 feet.

C. Carriers shall be constructed of nylon, supported from two heavy duty polyethylene wheels held in the ball bearing by a nickel plated steel rivet.
   1. Each carrier shall be equipped with a free-moving swivel and sufficient trim chain to accommodate a curtain S-hook.
      a. Each carrier shall have a back-pack. Rubber washers between each back-pack and carrier shall serve as noise eliminators.

D. The master carrier block shall be constructed of plated steel having two cable clips to clamp the cord to the carrier. The block shall be supported by four wheels in pairs identical to the single carrier above.

E. Live and dead end pulleys shall be adjustable, equipped with oil-impregnated sleeve bearing wheels on adequately guarded plated steel housings.

F. End stops at each track end and one adjustable, floor pulley shall be furnished.

G. Stretch-resistant, fiberglass center operating cord shall be 3/8 inch in diameter. Track shall be rigged for bi-parting operation with a 36 inch center overlap.

H. Provide track hanging clamps for connection to the dead hung batten at six foot maximum intervals.
   1. Basis of Design Product: J.R. Clancy No. 24-280 track assembly, or approved equivalent.

I. Operation:
   1. Manual Walk-Along Operation: Curtain track without a cord, cable, pulleys, or floor pulley; must walk with curtain to open and close.

2.06 FABRICATION - CURTAINS

A. General: Provide vertical seams unless otherwise indicated, locate vertical seams so they do not fall on faces of pleats, and only use fabric that is cut greater than half the width of fabric.
   1. Facing the full width of material at center meeting edges.
   2. Curtains that are tabled square, and hems that don't pucker.
   3. 1-1/2-inch clearance from floor at bottom of curtain.
   4. Curtains are 24 inches longer than clear height of valance opening.
   5. Curtains that overlap 36 inches at the center.
   6. Curtains that extend 24 inches on each side beyond full width of proscenium opening.
   7. Seams: Seams between strips shall be single stitched without puckers using thread of matching color. All fabrics with a grain or pile shall have all strips running in the same direction.
   8. Pleats: Pleats shall be box type on 12 inch centers. Valances and borders are to have their pleats arranged to conceal the seams.

B. Vertical and Top Hems: Machine sew hems as follows, unless otherwise indicated:

1. Turnbacks: Fabricate leading-edge and trailing-edge turnbacks for traveler curtains by folding back at least 12 inches of face fabric, with at least 1-inch tuck, and vertically secured by sewing.

C. Fullness:
1. 50 Percent Fullness: Provide this fullness, exclusive of turnbacks and hems, and spaced at 12 inches on center along top hem reinforcement as follows:
a. Tying or hooking together adjacent grommets into round pleats.

D. Grommets:
1. Black Colored Curtains: stainless steel grommets.
2. Flat Curtains: stainless steel grommets at 12 inch on center and 1 inch from corner of curtain; for ties, snap hooks, or S-hooks.
3. Pleated Curtains: Provide grommets centered on each box pleat and placed 1 inch from corner of curtain; for snap hooks or S-hooks.

E. Bottom Hems: Machine sew hems as follows, unless otherwise indicated:
1. For Flat Curtains Without Fullness: Fabricate with 4-inch high lined hem with pocket for sliding pipe or conduit weight and stiffener into bottom of curtain, and with concealing flap of matching fabric on front side of pocket 2 inches longer than bottom edge of pocket.
2. For Curtains With Fullness:
a. Curtains That Don't Hang to Floor: Hems at least 3 inches deep, with weight tape, 3/4 inch, and open ends of hems sewn closed.
b. Floor Length Curtains: Hems at least 6 inch deep, with separate interior chain pockets filled with #8 plated jack chain. Chain pockets shall be stitched so that the chain will ride two inch above the finished bottom edge of the curtain.
3. Lining: Provide lining for curtain with matching fullness of face fabric and finished 2 inches shorter than face fabric, and sew or otherwise securely fasten lining to top hem of face fabric.
a. Attach lining to face fabric along bottom and side seams with 4-inch long strips of heavy woven cotton tape.
b. Sew lining to bottom edge of curtain to provide sufficient lining fabric for tucking and to accommodate for shrinkage.

2.07 FINISHES

A. Paint under this Section shall be the manufacturer's standard finish and color except as noted.
B. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted.

2.08 ACCESSORIES

A. S-Hooks: Manufacturer's standard heavy-duty plated wire hooks, at least 2 inches long.
B. Snap Hooks: Manufacturer's standard heavy-duty snap hooks, sewn into top edge of curtain.
C. Tie Lines: No. 4 cord or braided soft cotton tape, colored to best match curtain; at least 5/8 inch wide by 36 inch long and threaded through grommets.
D. Battens: All joints shall be sleeve spliced with 18 inch long sleeves with 9 inches extending into each pipe and held by two 3/8-inch hex bolts and lock nuts on each side of the joint.
1. Hang battens from overhead steel structures on 10 foot maximum centers using 1/4-inch proof coil chain or 1/4-inch 7 by 19 galvanized aircraft cable ending in 6 inch by 3/8-inch domestic forged turnbuckles attached to pipe clamps. Chains shall be fastened with 5/16-inch shackles and cables shall be formed over thimbles of correct size and fastened with two forged cable clips of Nicopress sleeves crimped three times. All turnbuckles are to be moused after final trim.

2. Dead Hung Batten shall be attached to the roof structural steel with Beam Clams nine foot on center. Beam clamps shall consist of two 10 gauge, three inch by eight inch steel plates with throats cut in the side to engage a beam flange. One plate has seven round holes while the other plate has three slotted holes for adjusting to various beam sizes. The plates are fastened together using two 3/8-inch by 1 inch long hex bolts with lock nuts.
3. Steel Pipe: 1-1/2 inch nominal diameter, Grade A, Schedule 40 in accordance with ASTM A53/A53M.
4. Finish: Matte black with 1 inch wide yellow colored stripe along center of each batten.
5. Basis of Design Product: J.R. Clancy No. 15-698 (3/8-inch throat) beam clamp or Architect approved equivalent.

E. Support, Clamps, and Anchors: Galvanized after fabrication sheet steel, Class B in accordance with ASTM A153/A153M; manufacturer's standard thickness.

F. Trim and Support Cable: 1/4-inch diameter, 7x19 galvanized steel cable with minimum breaking load (MBL) of 7,000 lb.
1. Provide fittings in accordance with cable manufacturer's written instructions for size, number, and method of installation, including a drop-forged galvanized turnbuckle to allow for leveling.

G. Trim and Support Chain: Hardened alloy steel chain rated for overhead lifting, Grade 80 in accordance with ASTM A391/A391M.

H. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard and corrosion-resistant.

I. Individual Curtain Bottom Weights: Curtain manufacturer's standard segmented weights in compliance with requirements for curtain type and location.

J. Proof Coil Chain, Curtain-Bottom Weight: No. 8, zinc plated, 3/16-inch diameter, Grade 30 in accordance with ASTM A413/A413M.

K. Weight Tape: Curtain manufacturer's standard continuous weight tape to suit each curtain fabric type and location.

L. Pipe/Conduit Weight and Stiffener: Curtain manufacturer's recommended stiffening pipe/conduit that slides into bottom hem of curtain, as suitable for curtain fabric type and location.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with installer present, for compliance with requirements for supporting structural members, blocking, clearances, installation tolerances, and other conditions that may impact performance of stage curtain assembly.

B. Examine placement and condition of inserts, clips, blocking, or other supports installed by other sections of these specifications and for use in supporting track and battens of stage curtain assembly.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Extent: All specified equipment shall be installed by fully trained superintendents and workers who are fully responsible to, and fully represent the stage rigging company. Equipment shall be installed in a workmanlike 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.

B. Install stage curtain assembly in accordance with curtain and track manufacturers written instructions.

C. Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes.

D. 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 AWS D1.1/D1.1M.

E. Curtains
   1. Defer installation of draperies until just before Substantial Completion, and after final cleaning of the area has been completed.
   2. Unpack draperies from crates or boxes in advance of installation and store flat, unfolded to height, in a clean, dry space to allow them to unwrinkle. Protect draperies from dust, dirt, or other damage during this period.
   3. Track Hung: Secure curtains to track carriers with S-hooks.
   4. Batten Hung: Secure curtains to pipe battens with S-hooks.
   5. After hanging draperies, remove wrinkles from fabric using a method approved by the drapery manufacturer or as described in published installation and maintenance instructions.

F. Battens:
   1. Install battens by suspending at heights as indicated with trim and supports spaced to support loads; do not exceed 10 feet between supports.
      a. Cable Trim and Support:
         1) Fasten cables securely to either structure or to inserts, eye screws, or other applicable devices that are appropriate for substrate and not subject to deterioration or failure with time or elevated temperatures.
         2) Attach other end of cable to pipe clamps with turnbuckles, housed or fixed securely after adjustment to prevent loosening.
      b. Chain Support: Secure chain for application with load-rated terminations.

G. Track:
   1. Mounting of Track Assembly:
      a. Ceiling Mounted: Provide ceiling supports for mounting track direct to ceiling structure and within intervals indicated in manufacturer's written instructions for on center spacing.
      b. Beam Mounted: Install track by suspending from beam clamps securely mounted to structural I-beam and within intervals indicated in manufacturer's written instructions for on center spacing.
      c. Wall Mounted: Install track by suspending from brackets securely mounted to wall construction and within intervals indicated in manufacturer's written instructions for on center spacing.
      d. Batten Mounted: Install track by suspending from pipe batten with manufacturer's acceptable track clamp hangers securely attached to batten pipe clamps and within intervals indicated in manufacturer's written instructions for on center spacing.
   2. Track Support Spacing: Comply with manufacturer's recommendations for applied loads, and not to exceed the following dimensions between track supports:
      a. Heavy-Duty Track: 6 feet, maximum.
   3. Install track for center-parting curtains with at least 24-inch overlap of track sections at center-line, and supported with track lap clamps.

H. Alignment: Mule blocks, cable rollers and guides shall be installed, to provide proper alignment, to maintain specified fleet angles, and to prevent contact with other surfaces.

I. Finishes:
   1. All welds shall 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.

3.03 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. The Construction Manager shall be responsible for cleanup, including removal of packing materials and other debris, and the protection of surfaces or equipment provided by other contractors.

3.04 INSPECTION AND TESTING

A. Observation: During the installation of equipment the rigging contractor shall arrange for access for observation of equipment by the Owner's representatives.

B. Special Testing: If specifications, the Architect's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the rigging contractor shall give the Architect timely notice of its readiness for testing, and of dates of testing to be made by other authorities.

C. Demonstration of proper operation: Upon completion of the installation of all work specified under this Section, the Construction Manager shall so notify the Architect, who will schedule a demonstration of working order. At the time of this demonstration, the rigging contractor shall furnish sufficient workers to operate all equipment and to perform such adjustments and tests as may be required by the Architect or Owner's representative. Any equipment which fails to meet with the Specifications shall be repaired or replaced with suitable equipment and the demonstration shall be re-scheduled under the same conditions as previously specified. At the time of these demonstrations, no other work shall be performed in the stage area. All temporary bracing, scaffolding, stairs, ramps, walkways, and other temporary items shall be removed to permit full operation of and access to all equipment. Final approval will be withheld until all systems have been thoroughly tested and found to be in first class operating condition in every aspect.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

C. Demonstrate proper operation of equipment to Owner's designated representative.

D. Demonstration: Demonstrate operation of system to Owner's personnel.

1. Use operation and maintenance data as reference during demonstration.
2. Briefly describe function, operation, and maintenance of each component.

E. Training: Train Owner's personnel on operation and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional manufacturer's recommended training materials.

3.06 PROTECTION

A. Protect installed stage curtain assembly from subsequent construction operations until date of Substantial Completion.

END OF SECTION

SECTION 11 66 23
GYMNASIUM EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following equipment:
   1. Basketball backboards, goals, and support framing.
   2. Floor sleeves for net and goal posts.
   3. Wall mounted protection pads.
   4. Volleyball nets and posts.
   5. Fold-up divider curtain.
   6. Accessories required for a complete installation including, but not limited to, secondary structural members supporting gymnasium equipment.

1.02 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
   1. FIVB. Fédération Internationale de Volleyball (English: International Volleyball Federation); www.fivb.com.
   2. NCAA. National Collegiate Athletic Association; www.ncaa.org.
   3. NFHS. National Federation of State High School Associations; www.nfhs.org.
   4. NFPA. National Fire Protection Association; www.nfpa.org.
      a. NFPA 70 - National Electrical Code.
   5. UL. Underwriters Laboratories; www.ul.org.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination, and as follows:
   1. Large Components: Ensure that large components can be moved into final position without damage to other construction.
   2. Electrically Operated Equipment: Coordinate location and electrical characteristics of service connection.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories; include:
      a. Electrical characteristics and connection locations.
   2. Fire rating certifications.
   3. Shop Drawings: For custom fabricated equipment indicate, in large scale detail, construction methods; method of attachment or installation; type and gauge of metal, hardware, and fittings; plan front elevation; elevations and dimensions; minimum one cross section; utility requirements as to types, sizes, and locations.
   4. Erection Drawings: Detailed dimensional requirements for proper location of equipment.
   5. Samples: Submit samples of wall pad coverings in manufacturer's available range of colors.
   6. Installer qualifications statement.
   7. Specimen warranties.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operating and maintenance data for each operating equipment item.
3. Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified with minimum five years of experience.

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

C. Single Source Responsibility: Furnish Gymnasium Equipment materials from one manufacturer for entire project, except where otherwise indicated in these specifications or otherwise acceptable to Architect.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.

B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.

C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide lifetime manufacturer warranty for breakage of backboards.

C. Provide eight year manufacturer warranty for backboard padding.

D. Provide five year manufacturer warranty for gym divider curtain.

E. Provide five year manufacturer warranty for backboard winches.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gymnasium Equipment: Subject to compliance with requirements of these Specifications, and except where otherwise noted below, provide equivalent products by one of the following:
1. Draper, Inc: www.draperinc.com.
2. IPI by Bison www.ipibybison.com. (Basis of Design)
3. Porter Athletic Equipment Company: www.porterathletic.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 GENERAL REQUIREMENTS

A. See Drawings for sizes and locations, unless noted otherwise.

B. Where mounting dimensions or sizes are not indicated, comply with applicable requirements of the following:
   1. NFHS sports rules.
C. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of Contract Documents.
D. Hardware: Heavy duty steel hardware, as recommended by manufacturer.
E. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.

2.03 FLOOR-MOUNTED EQUIPMENT

A. Volley Ball Nets and Posts: One court system of adjustable posts, net, and tensioning winch meeting requirements for FIVB, USA Volleyball, NCAA and NFHS competition requirements.
   1. Posts: 3-1/2 inch O.D. schedule 80 aluminum tube with 1 inch height adjustments between 42 and 96 inches.
   2. Net: 4 inch square #36 nylon cord with vinyl coated polyester hem, double stitched around the perimeter.
   3. Tensioning Winch: Manual crank heavy duty, self-locking worm gear mechanism.
B. Floor Sleeves for Posts: Metal sleeve, with latch cover, cast into concrete subfloor to hold poles for nets and goals; installed flush with finish floor surface.
   1. Latch Cover: Brass, round; tamper resistant lock with key.
   2. Round Pole Diameter: 3 1/2 inches outside diameter
   3. Depth of Sleeve: 9 inches from floor surface to bottom, including latch cover.

2.04 FOLD-UP DIVIDER CURTAINS

A. Curtain Material:
   1. Self extinguishing
   2. Lower 8 foot section: Polyester reinforced solid vinyl, 18 oz. per square yard
   3. Upper section: VCP mesh, woven vinyl encapsulated polyester yarns with a 50 percent grid for air circulation.
   4. Colors: To be selected from manufacturer's standard color selection.
B. Top Tube Batten:
   1. Supporting curtain shall be suspended from each drive pipe support assembly with adjustable 2/0 chain.
C. Curtain Hoist:
   1. 1/8 inch diameter steel aircraft cable spaced not to exceed 10 feet on center.
   2. Electrical operated with a 3/4 hp, 115v, single phase reversible motor with built-in thermal overload protection.
   3. Recessed keyed-switch, three position momentary contact.
D. Basis of Design: Model IP850 Fold-Up Gym Divider Curtain manufactured by IPI By Bison

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.
   2. Inspect areas and conditions before installation, and notify Architect in writing of unsatisfactory or detrimental conditions.
   3. Do not proceed with this work until conditions have been corrected; commencing installation constitutes acceptance of work site conditions.

4. Verify that walls to receive wall mounted backstop assemblies are grouted solid to receive anchors.
5. Verify that overhead framing provided by 05 00 01 - Miscellaneous Metals Trade Bid Summary has been installed in accordance with manufacturer's mounting requirements.

3.02 INSTALLATION

A. General: Install equipment according to the Drawings, approved submittals, manufacturer's instructions, and as follows:
   1. Install in accordance with Contract Documents and manufacturer's instructions.
   2. Coordinate installation of inserts and anchors that must be built in to flooring or subflooring.
   3. Install equipment rigid, straight, plumb, and level.
   4. Secure equipment with manufacturer's recommended anchoring devices.
   5. Separate dissimilar metals to prevent electrolytic corrosion.
   6. Coordinate final connection of motorized equipment with Division 26 Electrical sections.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Finish touch-up damaged surface finishes
   2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.04 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
B. Remove masking or protective covering from finished surfaces.
C. Clean equipment in accordance with manufacturer's recommendations.

3.05 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

END OF SECTION

SECTION 11 68 00
PLAY EQUIPMENT AND STRUCTURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes the following freestanding and composite structures of the playground equipment as specified herein and located in the Contract Drawings:
   1. 2 to 5-year play structures; Pre-K Playground.
   2. 5 to 12 year play structures; K – 2nd Grade.
   3. 5 to 12 year play structures; 3rd – 5th Grade.

B. Related Sections:
   1. Section 03 30 00.13 “CAST-IN-PLACE CONCRETE (SITE)" for installing pipe sleeves cast in concrete footings.
   2. Section 11 68 10 “SPORTS EQUIPMENT” for basketball hoop and post.
   3. Section 31 00 00 "EARTH MOVING" for excavation for installing concrete footings.
   4. Section 32 18 16.13 “PLAYGROUND PROTECTIVE SURFACING” for protective surfacing under and around playground equipment.

1.03 DEFINITIONS AND COMPLIANCY

A. Play equipment design, layout and installation shall comply with the following:
   1. ASTM – American Society for Testing and Materials, Designation F1487, Standard Consumer Safety Performance Specification for Playground Equipment for Public Use, latest edition and related sections.
   2. CPSC – US Consumer Product Safety Commission: Public Playground Safety Handbook, latest edition.
   3. ANSI – American National Standard Institute as it relates to ASTM standards (https://webstore.ansi.org/safety_standards/consumer-products/playground-equipment.aspx)
   4. AASHTO – American Association of State Highway and Transportation Officials (test of specifications).
   5. MassDOT – Latest edition of the Standard Specifications for Highways and Bridges and Waterways
   6. MAAB – Massachusetts Access Board

B. IPEMA: International Play Equipment Manufacturers Association.

C. Requirements not specified set forth herein, but required by the agencies listed above shall be understood to be a requirement of this contract since these standards of quality and safety are established as the industry standard(s). Any conflicts between the agency standards and the contract documents shall be brought to the attention of the Owner’s Representative, and unless otherwise directed in writing, the agency standards shall be the minimum requirement to be followed.

D. CPSI: Certified Playground Safety Inspector (by the NRPA National Recreation and Park Association)

E. Fall Height: According to ASTM F1487, "the vertical distance between a designated play surface and the protective surfacing beneath it."

F. Use Zone: According to ASTM F1487, the "area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around the equipment and

on whose surface it is predicted that a user would land when falling from or exiting the equipment."

G. HDPE: High-density polyethylene.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Certificates for Credit MR 6, Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

C. Shop Drawings: For playground equipment and structures. Include plans, elevations, sections, details, and attachments to other work. Shop drawings shall stipulate and certify compliance with all CPSC and ASTM standards and guidelines as applicable.

D. Samples for Initial Selection: For each type of playground equipment and structure indicated.

1. Manufacturer's color charts.
2. Include similar samples of playground equipment and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared as Samples of size indicated below.

1. Posts and Rails: Not less than six inches (150 millimeters) long.
2. Platforms: Not less than six inches (150 millimeters) square.
3. Molded Plastic: Not less than three inches (75 millimeters) square.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Extent of surface systems and use zones for equipment.
2. Critical heights for playground surfaces and fall heights for equipment.

B. Qualification Data: General Contractor to submit qualified Installer CPSI number. General Contractor to submit verification that manufacturer and testing agency are compliant with current ASTM and IPEMA safety regulations.

C. Product Certificates: For each type of playground equipment, from manufacturer.

D. Material Certificates: For the following items, signed by manufacturers:

1. Shop finishes.
2. Wood-Preservative Treatment: Include certification by treating plant that states type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
3. Recycled plastic.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of playground equipment.

F. Field quality-control reports.

G. Warranty: Sample special warranty.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For playground equipment and finishes to include in maintenance manuals and kits in an organized fashion.

B. A final playground (low frequency) inspection from a Third Party CPSI (independent entity **not** associated with any playground manufacturer, supplier, contractor or designer) shall confirm playground has been inspected and that it is compliant and safe for public use.

C. Each playground manufacturer shall provide a letter or certificate confirming that the play equipment was installed according to the manufacturer's recommendations and is compliant with all playground safety standards and regulations listed in paragraph 1.3.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.
   1. Provide playground equipment and play structure components bearing the IPEMA Certification Seal.
   2. Provide the following playground equipment and play structure components bearing the IPEMA Certification Seal:

B. Installer Qualifications:
   1. A minimum of five years' experience with a minimum of 15 playground installations. References will be required.
   2. A CPSI licensed contractor shall be onsite during the installation of the play equipment.
   3. Installation Contractor may request an onsite visit of the manufacturer's CPSI employer to make sure all play pieces are compliant and safe before, during, and after installation.

C. Safety Standards: Provide playground equipment complying with or exceeding requirements in ASTM F 1487 and/or CPSC No. 325.

D. Preinstallation Conference: Conduct conference at Project site.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Workmanship (installation) warranty Period: at least two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PLAY EQUIPMENT MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following, or approved equal:
   1. Landscape Structures, 601 7th Street South, Delano, MN 55328; Telephone: 888.438.6574; Email: info@playlsi.com; Website: www.playlsi.com; John McConkey New England Regional Sales Representative; John McConkey; Telephone: 508.533.6342; Email: JohnMcConkey@obrienandsons.com.
   2. GameTime, 150 PlayCore Drive SE, Fort Payne, AL 35967; Telephone 800.235.2440; Email: info@gametime.com; Website: https://www.gametime.com; MRC Local Representative; Erik Walsh, Cell: 978.569.3797; Email: ewalsh@mrcrec.com; Website: mrc@gametime.com; MRC Home Office P.O. Box 106, Spring Lake, NJ 07762; Telephone: 800.922.0070; Fax: 732.974.0026.
   3. Berliner Seilfabrik Play Equipment Corporation, 96 Brookfield Oaks Drive; Suite 140, Greenville, SC 29607; Telephone 877.837.3676; Email: info@berliner-playequipment.com; Website: www.berliner-playequipment.com.

B. Any manufacturer's names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required.

This is not a proprietary specification, and it should be noted that "or equivalent" applies to all products denoted herein. It is understood that all manufacturers will have minor variations in configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an equivalent. It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that can supply similar products.

C. Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: see Section 01 25 00 "SUBSTITUTION PROCEDURES".

2.02 FREESTANDING PLAYGROUND EQUIPMENT AND STRUCTURES

A. Freestanding Play; 2 to 5-years; **MEO 26012**: NOTE:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings by Landscape Structures or approved equal:
   a. See Drawings for Play equipment pieces.

2. Age Appropriateness: 2 through 5 years.
   a. Final Signage Selections regarding safety and age appropriateness information to be made from manufacturer's designation during the Shop Drawing Process.

3. Color Specification:
   a. Colors: Refer to playground renderings for preferred color pallets.
   b. Final Color Selections to be made from manufacturer's designation during the Shop Drawing Process.

4. Manufacturer Warranty:
   a. Landscape Structures Inc. ("Manufacturer") warrants that all playstructures and/ or equipment sold will conform in kind and in quality to the specifications manual for the products identified in the Acknowledgment of Order and will be free of defects in manufacturing and material. Manufacturer further warrants:
   b. 100-YEAR LIMITED WARRANTY
      1) On all PlayBooster® and PlayShaper® aluminum posts, stainless steel fasteners, clamps, beams and caps against structural failure due to corrosion/natural deterioration or manufacturing defects, and on PlayBooster steel posts against structural failure due to material or manufacturing defects.
   c. 15-YEAR LIMITED WARRANTY
      1) On all Evos® and Weevos® steel arches, all plastic components (including TuffTimbers™ edging), all aluminum and steel components not covered above, Mobius® climbers, Rhapsody® Outdoor Musical Instruments, decks and TenderTuff™ coatings (except Wiggle Ladders, Chain Ladders and Swing Chain) against structural failure due to material or manufacturing defects.
   d. 10-YEAR LIMITED WARRANTY
      1) On concrete products against structural failure due to natural deterioration or manufacturing defects. Does not cover minor chips, hairline cracks or efflorescence.
   e. EIGHT-YEAR LIMITED WARRANTY
      1) On Aeronet® climbers and climbing cables against defects in materials or manufacturing defects.
   f. FIVE-YEAR LIMITED WARRANTY
      1) On Rhapsody® cables and mallets against defects in materials or manufacturing defects, on polycarbonate panels against defects in materials or manufacturing

defects, and on bamboo panels against delamination due to defects in materials or manufacturing defects. Does not cover damage which may be associated with the natural characteristics of bamboo aging, including but not limited to discoloration, splitting, cracking, warping or twisting, nor the formation of algae, mold and other forms of fungal-type bodies on bamboo.

g. THREE-YEAR LIMITED WARRANTY
   1) On all other parts, i.e.: Pulse® products, all swing seats and hangers, Mobius climber handholds, Wiggle Ladders, Chain Ladders and ProGuard™ Swing Chain, Track Ride trolleys and bumpers, all rocking equipment including Sway Fun® gliders, belting material, HealthBeat® resistance mechanism, Seesaws, etc., against failure due to corrosion/ natural deterioration or manufacturing defects.
h. The environment near a saltwater coast can be extremely corrosive. Some corrosion and/or deterioration is considered “normal wear” in this environment. Product installed within 500 yards (457 meters) of a saltwater shoreline will only be covered for half the period of the standard product warranty, up to a maximum of five years, for defects caused by corrosion. Products installed in direct contact with saltwater or that are subjected to salt spray are not covered by the standard warranty for any defects caused by corrosion.
i. This warranty does not include any cosmetic issues or wear and tear from normal use of the product, or misuse or abuse of the product. It is valid only if the playstructures and/or equipment are erected to conform with Landscape Structures’ installation instructions and maintained according to the maintenance procedures furnished by Landscape Structures Inc.

B. Freestanding Play; 5 to 12-years; MEO 26012: NOTE:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings by Landscape Structures or approved equal:
   a. See Drawings for Play equipment pieces.

2. Age Appropriateness: 5 through 12 years.
   a. Final Signage Selections regarding safety and age appropriateness information to be made from manufacturer’s designation during the Shop Drawing Process.

3. Color Specification:
   a. Colors: Refer to playground renderings for preferred color pallets.
   b. Final Color Selections to be made from manufacturer’s designation during the Shop Drawing Process.

4. Manufacturer Warranty:
   a. Landscape Structures Inc. (“Manufacturer”) warrants that all playstructures and/ or equipment sold will conform in kind and in quality to the specifications manual for the products identified in the Acknowledgment of Order and will be free of defects in manufacturing and material. Manufacturer further warrants:
   b. 100-YEAR LIMITED WARRANTY
      1) On all PlayBooster® and PlayShaper® aluminum posts, stainless steel fasteners, clamps, beams and caps against structural failure due to corrosion/natural deterioration or manufacturing defects, and on PlayBooster steel posts against structural failure due to material or manufacturing defects.
   c. 15-YEAR LIMITED WARRANTY
      1) On all Evos® and Weevos® steel arches, all plastic components (including TuffTimbers™ edging), all aluminum and steel components not covered above,

Mobius® climbers, Rhapsody® Outdoor Musical Instruments, decks and TenderTuff™ coatings (except Wiggle Ladders, Chain Ladders and Swing Chain) against structural failure due to material or manufacturing defects.

d. 10-YEAR LIMITED WARRANTY
   1) On concrete products against structural failure due to natural deterioration or manufacturing defects. Does not cover minor chips, hairline cracks or efflorescence.
e. EIGHT-YEAR LIMITED WARRANTY
   1) On Aeronet® climbers and climbing cables against defects in materials or manufacturing defects.
f. FIVE-YEAR LIMITED WARRANTY
   1) On Rhapsody® cables and mallets against defects in materials or manufacturing defects, on polycarbonate panels against defects in materials or manufacturing defects, and on bamboo panels against delamination due to defects in materials or manufacturing defects. Does not cover damage which may be associated with the natural characteristics of bamboo aging, including but not limited to discoloration, splitting, cracking, warping or twisting, nor the formation of algae, mold and other forms of fungal-type bodies on bamboo.
g. THREE-YEAR LIMITED WARRANTY
   1) On all other parts, i.e.: Pulse® products, all swing seats and hangers, Mobius climber handholds, Wiggle Ladders, Chain Ladders and ProGuard™ Swing Chain, Track Ride trolleys and bumpers, all rocking equipment including Sway Fun® gliders, belting material, HealthBeat® resistance mechanism, Seesaws, etc., against failure due to corrosion/ natural deterioration or manufacturing defects.
h. The environment near a saltwater coast can be extremely corrosive. Some corrosion and/or deterioration is considered “normal wear” in this environment. Product installed within 500 yards (457 meters) of a saltwater shoreline will only be covered for half the period of the standard product warranty, up to a maximum of five years, for defects caused by corrosion. Products installed in direct contact with saltwater or that are subjected to salt spray are not covered by the standard warranty for any defects caused by corrosion.
i. This warranty does not include any cosmetic issues or wear and tear from normal use of the product, or misuse or abuse of the product. It is valid only if the playstructures and/or equipment are erected to conform with Landscape Structures’ installation instructions and maintained according to the maintenance procedures furnished by Landscape Structures Inc.

2.03 CAST-IN-PLACE CONCRETE FOOTINGS

A. Top of the concrete footings shall be 12 inches minimum below finished grade and shall pitch outwards from the post.

B. Concrete Materials and Properties: Concrete installation should be according to the Manufacturer Specification. Comply with requirements in Section 03 30 00.13 "CAST-IN-PLACE CONCRETE (SITE)" for normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of 5,000 pounds per square inch (31 Megapascals).

2.04 MAINTENANCE KIT

A. At the completion of construction, the Contractor shall provide to the Owner a Maintenance Kit containing all touchup paint, maintenance instructions, spare parts, and other maintenance materials provided by the manufacturers of each and all play equipment. This kit shall include all replacement hardware covers/caps for each play component/structure, graffiti removal, cleaning solutions as recommended by the manufacturer, and a manual that includes all installation and maintenance instructions as provided by the manufacturer.

B. The Contractor shall provide 10 spare pieces of each type of hardware / fastener used on the structure and the appropriate tools delivered to the Owner's Maintenance Yard.
C. The Maintenance Kit shall be delivered in a single container clearly labeled with the Park Name, and each item shall be identified as to the source.

PART 3 EXECUTION

3.01 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 of the Work.
   1. Do not begin installation before final grading required for placing protective surfacing is completed unless otherwise approved by Owner's Representative.
B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Owner's Representative.

3.02 PREPARATION

A. Verify locations of playground perimeter and pathways. Verify that playground layout and equipment locations comply with requirements for each type and component of equipment.

3.03 INSTALLATION, GENERAL

A. All play equipment shall be assembled and installed under the supervision of an approved Supervisor with CPSI qualifications and experience, as required in this specification section.
B. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.
   1. Maximum Equipment Height: Coordinate installed heights of equipment and components with finished elevations of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.
C. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.
D. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.
E. Post Set with Concrete Footing: Comply with Section 03 30 00.13 "CAST-IN-PLACE CONCRETE" for measuring, batching, mixing, transporting, forming, and placing concrete.
   1. Set equipment posts in concrete footing or as required by manufacturer. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.
      a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
   2. Embedded Items: Use setting drawings and manufacturer's written instructions to ensure correct installation of anchorages for equipment.
   3. Concrete Footings: Smooth top, and shape to shed water.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
B. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
C. Tests and Inspections: For playground and playground equipment and components during installation and at final completion and to certify compliance with ASTM F 1487 and CPSC No. 325.

D. Prepare test and inspection reports.
E. Notify Owner's Representative 48 hours in advance of date and time of final inspection.

3.05 GUARANTEE AND ACCEPTANCE/LIABILITY

A. All operating parts and structural elements of the play equipment and safety surface shall be guaranteed against failure or defect during normal use and operation for the entire warrantee period as established by the manufacturer.
B. Any defective elements shall be replaced in part or whole by the Contractor at no cost to the Owner.
C. The Contractor and the manufacturer shall hold the Owner and Owner's Representative harmless from any and all damages or liability resulting from negligent acts and omissions on the part of the Contractor or manufacturer, or resulting from defective parts, or improperly assembled equipment.
D. Contractor shall provide secure storage for all equipment on job site. Any defect / imperfection on any part of the play equipment shall be reported to the manufacturer promptly for the manufacturer's inspection and replacement.
E. Contractor shall submit written specification from Manufacturer that all new play elements have been installed in accordance with their prescribed standards before final inspection.
F. Contractor is responsible for securing a third-party Certified Playground Safety Inspector to perform a low frequency inspection of the completed playground for ASTM and CPSC compliance prior to use by the public. A low frequency inspection report shall be issued to the Owner and Owner's Representative prior to substantial completion.

END OF SECTION

SECTION 11 68 10
SPORTS EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes:
   1. Basketball Hoop and Net.
   2. Player Benches.
   3. Portable Soccer Goal.

B. Related Sections:
   1. Section 03 30 00.13 "CAST-IN-PLACE CONCRETE (SITE)" for installing pipe sleeves cast in concrete footings.
   2. Section Section 31 00 00 "EARTH MOVING" for excavation for installing concrete footings.
   3. Section 32 12 16.36 “ATHLETIC ASPHALT-BIT CONC SPORT COURT PAVING” for court paving.
   4. Section 32 18 10 “COURT SURFACING” for multiuse sport court sealcoat surfacing.
   5. Section 32 18 16.13 “PLAYGROUND PROTECT SURFACING” for protective surfacing under and around playground equipment.
   6. Section 32 18 13 “SYNTHETIC TURF SURFACING ACTIVE USE – FALL ZONE” for synthetic turf.
   7. Section 32 18 23.43 “RECREATIONAL PAVEMENT MARKINGS” for court line stripe.
   8. Section 32 31 13 “CHAIN LINK FENCING AND GATES” for fencing coordination.
   9. Section 32 91 31 “ATHLETIC FIELDS” for turf grass

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:
   1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Certificates for Credit MR 6, Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

C. Shop Drawings: Prior to ordering the below listed materials, submit Shop Drawings to the Owner’s Representative for acceptance as follows:
   1. Provide Shop Drawings for the Basketball Hoop and Net including footings.

D. Manufacturer’s Literature: Submit copies of each of the manufacturer’s material descriptions and installation instructions for the following. Do not order materials until Owner Representative’s acceptance has been obtained. Delivered materials shall closely match the accepted samples:
   1. Basketball Hoop and Net.
   2. Player Benches.
   3. Portable Soccer Goals.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sport equipment and finishes to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful sports equipment installations.
   1. Experience: Three years' experience in sport equipment installation of similar quality, schedule requirement and construction detailing.
   2. Installer's Field Supervision: Require Installer to maintain an experienced full-time foreman or crew leader on Project site when work is in progress.

1.06 GUARANTEE

A. All sports equipment parts shall be guaranteed against workmanship and material defects for one year from time of delivery, or as noted herein.

PART 2 PRODUCTS

2.01 SPORT EQUIPMENT MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following, or approved equal:
   1. JayPro Sports, LLC, 976 Hartford Turnpike; Waterford, CT 06385; Telephone: 800.243.0533; Email: orders@jaypro.com; Website: www.jayprosports.com.
   2. Goalrilla, 96 Brookfield Oaks Drive; Suite 140, Greenville, SC 29607; Telephone 800.467.1421; Website: www.goalrilla.com.
   3. TrueBounce, 56 Conduit Street, New Bedford, MA 02745. Telephone: 508.999.3020; Fax: 877.841-3715; Website: www.truebounce.com.
   4. Aluminum Athletic Equipment Company (AAE), 1000 Enterprise Drive, Royersford, PA 19468-1298, Telephone: 800.523.5471, Fax: 610.825.2378, E-mail: info@aaesports.com.
   5. Beacon Athletics, 8233 Forsythia Street, Suite 120, Middleton, WI 53562, Telephone: 800.747.5985, Fax: 608.836.0724.
   6. On Deck Sports, 15 Pacella Park Drive, Suite 240, Randolph, MA 02368; Telephone: 800.365.6171; E-mail: info@ondecksports.com; Website: www.ondecksports.com.
   7. Sportsfield Specialties, 41155 State Highway 10, P.O. Box 231, Delhi, NY 13753; Telephone: 888.975.3343; Telephone: 800.746.8481; Website: www.sportsfield.com.

B. Any manufacturer's names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is not a proprietary specification, and it should be noted that "or equivalent" applies to all products denoted herein. It is understood that all manufacturers will have minor variations in configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an equivalent. It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that can supply similar products.

C. Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions: see Section 01 25 00 "SUBSTITUTION PROCEDURES".

2.02 SPORT COURT EQUIPMENT AND STRUCTURES

A. Basketball Goal and Net
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Jaypro Sports; Model # CVAC66 Titan Adjustable Hoop with Acrylic backboard, or approved equal.
   2. Post: Galvanized-steel pipe.
      a. Six-inch by six-inch by seven-gauge pole upright with a four-foot offset at regulation height.
      b. Direct Bury

c. Finish: duplex coating, hot dip galvanized plus powder coat color: black.

3. Backboard: Acrylic Board.
   a. Color: Standard Red Border and Target.
4. Goals: Breakaway Playground.
   a. Color: Standard Red.
5. Net: Manufacturer's standard.
   a. Color: As indicated by Manufacturer's designations.
6. Equipment: Include the following play event components.
   a. Protective Pad; Color: Black.

2.03 SPORT GOALS

A. Portable Soccer Goals:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Aluminum Athletic Equipment Company (AAE); Model #: SGR-P/18.5 or approved equal:
2. Size: 6'-6" by 18'-6".
3. Materials:
   a. Crossbar: four-inch round one-piece custom slotted by 1/8-inch wall by 24'-8" long 6061T6 custom aluminum extrusion tube with two welded stay sockets powder-coated white.
   b. Uprights: four-inch round custom slotted by 1/8-inch wall by 92-inch long 6061T6 custom aluminum extrusion with one welded stay-socket powder-coated white.
   c. Uprights attach to crossbar via three- and 3/4-inch round by eight inch long solid heavy-duty UHMW connectors.
   d. Stay: two-inch square custom slotted by .125-inch wall 6063T4 aluminum tube 21'-2" long by three-foot top by eight-foot bottom.
   e. Groundbar: two-inch square custom slotted by 24-foot long 6061T6 aluminum tube with endplates.
   f. Molded net clips for net attachment
4. Color: White Powder Coat
5. Hardware: Stainless steel and galvanized hardware, including anchor hardware.
6. Soccer Net: Model # SN-3/24-W (Soccer Net), High Visibility White three mm twine polyethylene braided five-inch square mesh net, measures 24 feet wide by eight foot high by four-foot top depth and 10-foot bottom depth with a 1/4-inch MFP rope border.
7. Wheels: Model # RW-SG, removable 10-inch pneumatic tires mounted on a 3/4-inch diameter stainless steel axle.
8. Sandbags: Model # VSZ-Y, 18 inches long by 18 inches wide yellow vinyl sandbag with sewn in zipper and canvas handles, holds 60-pound weight.

2.04 PLAYERS BENCHES

A. Provide manufacturer's product data for Owner's Representative acceptance prior to ordering.

B. Provide and install new and fully assembled players' benches. Surface mount to concrete pavement utilizing galvanized or stainless-steel tamperproof anchor bolts. Cut flush to bolt after installation. Concrete footings shall conform to the shape and size indicated on the Shop Drawing, or General Contractor will be required to remove and replace the footings at his/her expense.

C. Products: Subject to compliance with requirements, provide the following:

1. Players Benches:
   a. Model #: TB-15B-SP "Permanent Team Bench with Backrest (21-foot length) as manufactured by Aluminum Athletic Equipment Company (AAE).

b. Materials: Player's Bench shall be constructed of heavy duty extruded aluminum; frame shall be 2 3/8-inch outside diameter galvanized steel with polyester finish.
c. Color: Selection by Owner's Representative.
d. Hardware: Use all stainless-steel hardware or as recommended by manufacturer.

2.05 CAST-IN-PLACE CONCRETE

A. Top of the concrete footings shall be 12 inches minimum below finished grade and shall pitch outwards from the post.
B. Concrete Materials and Properties: Concrete installation should be according to the Manufacturer Specification. Comply with requirements in Section 033000.13 "CAST-IN-PLACE CONCRETE (SITE)" for normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of 5,000 pounds per square inch (31 Megapascals).

2.06 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: A minimum dry film thickness of three to five mils (0.076 to 0.127 millimeters), medium gloss. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 EXECUTION

3.01 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 of the Work.
   1. Do not begin installation before final grading required for placing protective surfacing is completed unless otherwise permitted by Owner's Representative.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Verify locations of play perimeter and pathways. Verify that equipment locations comply with requirements for each type and component of equipment.

3.03 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Anchor sports equipment securely, positioned at locations and elevations indicated.
B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.
C. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.
D. Post Set with Concrete Footing:
   1. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.
      a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
   2. Embedded Items: Use setting drawings and manufacturer's written instructions to ensure correct installation of anchorages for equipment.
   3. Concrete Footings: Smooth top, and shape to shed water.

3.04 CLEANING, REPAIR AND PROTECTION

A. Repair minor damage to eliminate all evidence of repair. Remove and replace work that cannot be satisfactory repaired.
B. Provide temporary protection to ensure that the Work will be without dirt, stains, damage or deterioration at time of final acceptance. Clean up stains and spills as they occur. Remove protections and clean immediately before final acceptance.
C. Notify Owner's Representative 48 hours in advance of date and time of final observation.

END OF SECTION

SECTION 11 95 13
KILNS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The work of this section includes fabrication, furnishing, delivering, and installing the following work:
   1. Electric kilns.
   2. Downdraft ventilation system.
   3. Accessories and hardware required for a complete installation, and as specified herein.

1.02 ABBREVIATIONS AND ACRONYMS

A. NEMA. National Electrical Manufacturers Association; www.nema.org.
B. NFPA. NFPA. National Fire Protection Association; www.nfpa.org.
C. UL. Underwriters Laboratories; www.ul.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

A. Submit the following in accordance with the provisions of Section 01 30 00 - Administrative Requirements.
B. Construction Submittals
   1. Product Data: Submit for kilns, ventilation systems, and accessories.
   2. Specimen warranties.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.
   2. Operating and Maintenance Data: For kilns, controls, and ventilation system, including functional parts and safety features.
   3. Training Logs and Video.
      a. Submit in accordance with requirements of Section 01 78 00 - Closeout Submittals.
   4. Materials Receipts: Submit itemized receipts signed by the Owner's authorized representative acknowledging delivery of loose accessory items specified.
   5. Warranties: Submit executed proof of completion and registration of manufacturer's warranty in the name of the Owner or Owner's designated representative.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination.

B. HVAC Trade Contractor to integrate kiln controls with HVAC ventilation system.

1. Refer to Mechanical Drawings and Division 23 HVAC sections for description of HVAC sequence of operation related to kiln temperatures.

C. Coordinate electrical power and requirements for interconnection of equipment and devices with Electrical Trade Contractor.

D. Coordinate installation of downdraft ventilation system with HVAC Trade Contractor, who will provide ducted penetration at building envelope.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain kilns, ventilation systems, and accessories through one source from a single manufacturer.

B. Kiln and ventilation system to be UL listed as a system.

C. Regulatory Requirements: Comply with provisions of the following product certifications:

1. NFPA: Provide kilns and ventilation systems listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. UL and NEMA: Provide electrical components required as part of kilns and ventilation systems that are listed and labeled by UL and that comply with applicable NEMA standards.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver kilns, ventilation systems, and accessories in manufacturer’s original packaging with protective covering intact.

B. Store kilns per manufacturer's instructions and the following, if more stringent:

1. Do not stack other items on top of packaged kilns during transportation and storage. Stack kilns with top end up.
2. Protect from damage due to weather, excessive temperature, and construction operations.

1.08 WARRANTY

A. Provide manufacturer’s standard form in which manufacturer of each kiln specified agrees to repair or replace kilns that fail in materials or workmanship within specified warranty period.

1. Kiln: Minimum two-year limited warranty.
2. Downdraft ventilation system: Minimum one-year warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to requirements of this section, acceptable manufacturers include:

1. American Art Clay Company (AMACO): www.amaco.com.
2. L&L Kilns: www.hotkilns.com.
3. Olympic Kilns; product: Medallion Artist Series: www.greatkilns.com.
4. Paragon Kilns: www.paragonweb.com.
5. Skutt Kilns; KM-1227-PK with Envirovent 2 downdraft ventilation and Envirolink controls: www.skutt.com. (Basis of Design)
6. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 ELECTRIC KILNS

A. Electric Kilns: 10 or 12-sided electric kilns with components, options, and accessories needed to comply with requirements and provide complete functional kilns including the following:

1. Kiln stand: One piece welded frame stand of sufficient height to accommodate downdraft ventilation system.
2. Kiln floor or slab: Full plate steel with fire brick lining.
3. Fire brick: premium quality fire brick, 3 inch thick minimum for 10 cubic foot nominal capacity kiln and 2-1/2 inch thick minimum for 7 cubic foot nominal capacity kiln, precision-tooled and tightly fit with hairline joints.
4. Lid lift assist mechanism: Manufacturer's standard lift counterbalance or spring hinge assembly to allow one-handed lifting of lid, and support brace for lid in the open position.
5. Provide manufacturer’s Type "K" Thermocouple.
6. Kiln Control System: Digital programmable control system with multiple preprogrammed ramp-hold firing routines, and not less than four user-programmable firing routines.
7. Porcelain Peep plugs: Provide for inspection of kiln contents at each section of kiln.
8. Lid interlock mechanism to prevent opening the kiln during the firing process.

B. Electrical Characteristics:
1. Voltage: 208.
2. Phase: Three.
3. Amps: Maximum 50 amp breaker.
4. Watts: 14300.
5. Plug Connector Type: NEMA 15-50 configuration.

C. Dimensions and Firing Temperature Kiln "A":
1. Chamber opening width: 28 inches nominal.
2. Chamber height: 27 inches nominal.
3. Chamber volume: minimum 10 cubic feet nominal.
4. Maximum firing temperature: Cone 10.

2.03 DOWNDRAFT VENTILATION SYSTEM

A. Downdraft Ventilation System: Downdraft ventilation kit for attachment to bottom of kiln for exhausting fumes from kilns. System to consist of the following components:
1. Blower motor with minimum 6 foot power cord and in-line switch.
a. Blower motor capable of exhausting up to 24 cubic feet of kiln volume through up to 60 feet of duct.
b. UL listed.
c. Configured for 115 v 3 phase electrical service of less than 3 amps.
2. Flexible, round aluminum or high-temperature plastic duct with elbows, Y's, tees, and other trim required to complete installation to kilns.
3. Spring-loaded plenum cup assemblies for attachment to kilns.
4. Manufacturer’s standard mounting plates and hardware.

B. When multiple kilns are indicated, provide downdraft ventilation for each kiln, if ventilation of multiple kilns with one fan is not allowed by the manufacturer.

C. Electrical Switching Device: Provide manufacturer’s electrical switching device utilizing a programmable power output in the kiln controller or other interlink to turn the downdraft ventilation system on and off with the kiln.

2.04 ACCESSORIES

A. Angled Touchpad Mount: to permit easy viewing and programming of kiln controls.

B. Furniture Kits: Provide manufacturer’s recommended furniture kit based on size of kiln and firing temperatures.
1. Basis of Design: Skutt 5/8 furniture kit.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions where kilns, ventilation systems, and accessories are to be installed, for compliance with requirements that affect installation and for required installation tolerances. Notify Construction Manager in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected. Commencement of work of this section constitutes acceptance of substrate conditions.

1. Verify that appropriate power supply for kilns and downdraft ventilation systems have been provided.
2. Verify adequate space for kilns and for manufacturer's recommended safety clearances around kilns, and that combustible materials including combustible floor finishes do not exist within safety clearance areas.
3. Verify that electrical power to the kiln is interlocked with control of power to the HVAC heat rejection hood such that both the hood and kiln are activated at the same time by the same switch.
4. Verify that heat rejection hood(s) (when provided) are located above intended kiln location(s).
5. Verify that rigid ductwork has been installed to a termination point in proximity to kilns, suitable to receive flexible duct connections.
6. Verify that high-temperature sprinkler heads have been installed in vicinity of kilns.

3.02 PREPARATION

A. Modify kiln as recommended by manufacturer for installation of downdraft ventilation kit. Drill holes in top and bottom of kiln per manufacturer's instructions for kiln size and Owner's intended firing temperatures.

3.03 INSTALLATION

A. Install in strict accordance with manufacturer’s written installation instructions and recommendations.

B. Coordinate installation with adjacent work to ensure proper clearances.

C. Install units in final locations after finishes have been completed in each area.

1. Verify that clearances are adequate to properly operate equipment.
    a. Provide a minimum of 18 inches between kiln and adjacent walls, other kilns, shelving, and other obstructions.
2. When installing multiple kilns in the same room, ensure that the control boxes on the kilns are not facing adjacent kilns.
3. Set units level, plumb, properly aligned, and securely in place.

D. Downdraft Ventilation System:

1. Assemble and install system components on kiln in accordance with manufacturer’s written instructions.
2. Connect downdraft ventilation system ducts to rigid ductwork provided by Division 23 HVAC sections.
3. Interconnect downdraft ventilation system with kiln controls such that operation of the venting system is automatically controlled by kiln controls.

3.04 DEMONSTRATION AND TRAINING

A. Refer to Section 01 79 00 - Demonstration and Training for requirements for scheduling and notification of training, sign-in sheet, and length, and recording of training.

B. Refer to Section 01 78 00 - Closeout Submittals for closeout requirements, including number of copies of recorded training.
C. Demonstrate proper kiln operation and controls sequence to Owner. Allow four hours of training.

3.05 CLEANING AND PROTECTION

A. Comply with Section 01 74 19 - Construction Waste Management and Disposal.
B. Test kilns, ventilation systems, and accessories to verify proper operation. Make necessary adjustments.
C. Furnish specified accessories to the Owner or to the Owner's designated representative. Obtain copy of signed receipt of accessories and submit with closeout documentation.
D. Remove packing material and leave kilns in clean condition, ready for operation.

END OF SECTION

SECTION 12 24 00
WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following window shade work:
   1. Interior manual light-filtering and black-out roller shades.
   2. Interior light-filtering and black-out motorized roller shades.
   3. Shade pockets for gypsum board ceilings.
   4. Accessories for a complete installation including, but not limited to:
      a. Mounting hardware and fasteners.
      b. Low-voltage wiring.
      c. Motor controls.

1.02 ABBREVIATIONS AND ACRONYMS

A. AAMA. American Architectural Manufacturers Association: https://fgiaonline.org.
B. AHFA. American Home Furnishings Alliance; www.ahfa.us.
C. ASTM. ASTM International; www.astm.org.
D. CFR. Code of Federal Regulations: www.govinfo.gov.
E. FCC. Federal Communications Commission; www.fcc.gov.
F. ISO. International Organization for Standardization; www.iso.org.
G. MGL. Massachusetts General Laws; www.malegislature.gov/Laws/GeneralLaws.
H. NFPA. National Fire Protection Association; www.nfpa.org.
I. UL. Underwriters Laboratories; www.ul.org.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. 16 CFR 1112 and 1260 - Safety Standard for Operating Cords on Custom Window Coverings, a Rule by the Consumer Product Safety Commission.
C. 16 CFR 1303 - Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint.
D. AAMA 611 - Specification for Anodized Architectural Aluminum.
E. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
F. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments.
G. ISO 105-B02 - Textiles -- Tests for colour fastness -- Part B02: Colour fastness to artificial light: Xenon arc fading lamp test.
H. MGL, Part 1, Title II, Chapter 21A, Section 28 - Protection from Harmful Flame Retardants.
I. NFPA 70 - National Electrical Code.
J. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
K. UFS-1979-12 Following AHFA Joint Industry Fabric Standards and Guidelines for Upholstery Fabric - Constant-Rate-of-Extension Tensile Testing.
L. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Comply with requirements of Section 01 31 14 - Coordination.
2. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.
3. Coordinate the work with other trades to provide rough-in of electrical wiring for installation of hardwired motorized shades.

B. Preinstallation Meeting: Convene one week prior to commencing work related to products of this section; require attendance of affected installers.
   1. Per requirements of Section 01 31 14 - Coordination.

C. Sequencing and Scheduling:
   1. Comply with scheduling requirements of Section 01 32 16 - Construction Progress Schedule.
   2. Do not install shades until final surface finishes and painting are complete.
   3. Construction Manager shall provide job elevator, lift, and scaffold access during construction, up to Final Completion.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals:
   1. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, accessories, and the following.
      a. Preparation instructions and recommendations.
      b. Storage and handling requirements and recommendations.
      c. Fabric solar and optical performance.
      d. Typical blocking detail requirements.
      e. Motorized Shades: Include power requirements and standard wiring diagrams for specified products.
         1) Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
         2) Panel, power, wiring, cabling, j-box, outlet, and conduit requirements.
         3) Refer to Section 26 00 01 - Electrical Trade Bid Summary for additional requirements.
   2. Shop Drawings: Include head, jamb and sill details, clearance requirements, mounting dimension requirements for each product and condition, attachment methods, blocking requirements, and operation direction.
      a. Motorized Shades:
         1) Include motor system housing.
         2) Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.
      b. Field Measurements: Verify actual measurements for openings prior to fabrication, and after finish work is complete including window, window frame, trim installation.
         1) Coordinate field measuring just prior to finish painting.
         2) Indicate verified field measurements on shop drawings or schedule.
   3. Installer qualifications.
   4. Certificates: Submit the following:
      a. Certificate with manufacturer’s signature certifying that each product and/or system meets the requirements of the performance characteristics, physical criteria, and applicable standards specified.
      b. Manufacturer's documentation that products are lead-free.

c. Manufacturer's documentation that line voltage components are UL listed or UL recognized.

5. Selection Samples: Include fabric samples in full range of available colors, patterns, and finishes for control components.
   a. Motorized Shades: Include finish selections for wall switches and remote controls.
6. Verification Samples: Submit three samples, minimum size 3 by 5 inches, representing actual materials, color and pattern.
   a. Indicate interior and exterior faces on the shade-cloth.
   b. Submit finish selections for each system component exposed to view, including but not limited to: facias, shade pockets, and side channels.
      1) For motorized shades submit finish choices for wall switches and remote controls.
   c. Provide proposed shade components unassembled, demonstrating compliance with specified requirements.
7. Documentation of compliance with MGL, Part 1, Title II, Chapter 21A, Section 28.
8. Documentation of compliance with 16 CFR 1112 and 1260, for all window shade products on project.
9. Specimen warranties.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Environmental Product Declarations (EPD).
         2) Health Product Declarations (HPD).

D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.
   2. Project Record Documents: Record actual locations of control systems and show interconnecting wiring.
   3. Operation and Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, and instructions for operating hardware and controls. List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.
   4. Maintenance Material Submittals:
      a. Spare Parts: Submit no less than one additional complete shade unit of each size and type, including clutches and brackets, with each item wrapped and labeled.
         1) For motorized shades include no less than one additional complete motor, remote, and set of controls.
      b. Repair Kit: Provide ten roller shade ball chain repair and splicing kits, including splicing tools.

5. Warranties: Submit final executed warranties completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of this type with minimum five years of documented experience with shading systems of similar size and type.

B. Single Source Responsibility: Furnish roller shade system materials from one manufacturer for entire Project, unless otherwise acceptable to Architect.

C. Protection From Harmful Flame Retardants:
   1. Products shall comply with MGL, Part 1, Title II, Chapter 21A, Section 28.

D. Safety Standard for Operating Cords:
   1. Products of this Section shall comply with 16 CFR 1112 and 1260.

1.07 MOCK-UP

A. Mock-Up: Provide full size mock-up of window shade system complete with selected shade fabric including example of seams when applicable, installed in the project environment. Field samples as follows:
   1. Comply with requirements of Section.01 40 00 - Quality Requirements.
   2. Obtain Architect's approval of light and privacy characteristics of fabric prior to fabrication.
   3. Provide field sample mock-up of each different roller shade fabric and associated complete assembly as selected by the Architect to demonstrate aesthetic effects of materials in situ, assisting in making final selections prior to fabrication.
   4. Architect-accepted full-sized mock-up may become part of the final installation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s instructions and recommendations, and as follows:
   1. Comply with requirements of Section 01 60 00 - Product Requirements.
   2. Do not deliver window shades until building is enclosed, construction within spaces where shades will be installed is substantially complete, and final cleaning has commenced.

B. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

C. Handle and store shades in accordance with manufacturer's recommendations.

1.09 FIELD CONDITIONS

A. Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
   1. Roller Shade Components: Manufacturer's limited lifetime warranty against defects in materials and workmanship.
   2. Shade Hardware: 25 years minimum limited warranty.
   3. Electric Motors: Five years minimum.
   4. Fabric: 25 years minimum limited warranty.

C. Installation Warranty: Provide two year manufacturers and/or fabricator's installation warranty from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Interior Manually Operating Roller Shades: Subject to compliance with these specifications, provide products of one of the following:
   1. Draper, Inc; Flexshade, Techmatic, Sunbloc and GreenScreen Revive series: www.draperinc.com, or equal.
   2. Inpro Architectural Products: www.inprocorp.com. (Basis of Design)
   3. Rollease Acmeda Contract; Contract Series: www.rolleaseacmedacontract.com, or equal.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Interior Motorized Roller Shades, Motors and Motor Controls: Subject to compliance with these specifications, provide products of one of the following:
   1. Draper, Inc; Motorized FlexShade: www.draperinc.com, or equal.
   2. InPro Window Treatments; www.inpro-shades.com. (Basis of Design)
   3. Rollease Acmeda Contract; Contract Series One Medium Fascia Roller Shade: www.rolleaseacmedacontract.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 WINDOW SHADE APPLICATIONS

A. Roller Shade application Types for each exterior curtain wall as indicated, windows and all interior borrowed lights, storefronts, and side lights of doors, indicated by the drawings or Window Shade Schedule with related mounting systems and accessories, are as follows:
   1. Shade Type WS1: Manually operating, chain drive, light filtering / privacy shades.
   2. Shade Type WS1a: Manually operating, chain drive, light filtering / privacy shade at small interior borrowed lites.
   3. Shade Type WS2: Motorized light filtering roller shades, and related motor control systems.
   4. Shade Type WS3: Motorized, chain drive "double" light filtering and room darkening blackout roller shades, operating independently of each other, and related motor control systems.
   5. Shade Type WS4: Manually operating, chain drive room darkening roller shades, operating independently of each other.

2.03 ROLLER SHADES

A. General:
   1. Provide roller shade systems capable of accommodating a wide variety of shade sizes and fabric types.
   2. Provide chain operated system with spring assist when required to reduce pull force to lift heavy or large shades.
   3. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
   4. Provide shade system that operates smoothly when shades are raised or lowered.
   5. Motorized Shades: Tubular motor system housed and concealed inside roller tube, made for intermittent use, controlling shade movement via motor controls indicated; listed or recognized to UL 325.
      a. Comply with NFPA 70.
      b. Electrical Components: Listed, classified, and labeled as suitable for the purpose intended. Where applicable, system components to be FCC compliant.

c. Motors: Size and configuration as recommended by manufacturer for the type, size, and arrangement of shades to be operated; integrated into shade operating components and concealed from view; fully compatible with controls to be installed.
d. Mounting: Surface mounted to underside of soffit - within jamb openings with fascia.
e. Audible Noise: Maximum 39 dBA measured 3 feet from the motor unit; no audible clicks when motor starts and stops.
f. Control Compatibility: Fully compatible with the controls to be installed.
g. Low Voltage Inputs: Local programmable wall switches.
h. Low Voltage Inputs capable of tie-in to building audio-visual systems to lower shades simultaneously with projection screen.
i. Cabling per Division 26 - Electrical: Cat 5, Dry Contact or RS-232/RS-485 cabling and connectors allowing for full control of shades via interface. RS-232 bridge connects to controls via bus cable.

2.04 SHADE FABRIC

A. General requirements for shade fabric:
1. The fabric shall be tensioned in the finishing range prior to heat setting to keep the warp ends straight, minimize or eliminate weave distortion, and keep the fabric flat. The fabric shall be finished with heat and pressure and be dimensionally stable.
2. Material shall hang flat without buckling or distortion. The edge, when trimmed, shall hang straight without raveling. The unguided shade-band shall roll true and straight, without shifting sideways more than 1/8 inch in either direction due to warp distortion or weave design.
3. All fabric of each specified type shall be woven of the same yarns, have similar weaves, and be color matched by dye lot throughout project.
4. Shadecloth Dimensional Stability Tolerance: 0.5 percent maximum deviation.
a. Shadecloth Total Lead Content per 16 CFR 1303: Below limits.

B. Fabric: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
1. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
a. Roller shade manufacturer's preferred fabric, complying with these specifications including compliance with MGL, Part 1, Title II, Chapter 21A, Section 28.
b. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

C. Performance Requirements:
1. Flammability: Pass NFPA 701 large and small tests.
a. Materials installed must be identical in composition and comparable structure to those tested.
2. Stretch Certification: Shadecloth materials shall be tested in accordance with UFS-1979-12 Following AHFA Joint Industry Fabric Standards and Guidelines for Upholstery Fabric, at 27 pounds of no greater that 2.0 percent on the warp and 2.2 percent on the fill.
3. ISO 105-B02 UV Stability Xenotest on each shadecloth color shall be a minimum “6” passing rating on a grade scale of 1-8.

D. Fabric for Light-Filtering Shades: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
1. Material: Warp knit, 100 percent polyester, 89 percent recycled fiber content.

2. Openness Factor: 1 percent.
3. Color: As selected by Architect from manufacturer's full range of standard and custom colors.

E. Fabric for Room-Darkening (Opaque) Shades: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
1. Material: Close woven fiberglass base textile with UV-resistant vinyl film bonded to each side, with minimum tensile strength of 190 pounds for warp and 180 pounds for fill.
2. Openness Factor: None, 0 percent.
3. Weight: 12 ounces per square yard.
4. Thickness: Minimum 14 mil.
5. Roll Width: Not less than the width of each shade unit.
6. Color: As selected by Architect from manufacturer's full range of standard and custom colors.

2.05 MOTOR CONTROLS

A. Unless specifically indicated to be excluded, provide all required equipment necessary for a complete operating system that provides the control intent indicated, including but not limited to: conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming.

B. Provide all components and connections necessary to interface with other systems as indicated.

C. Individual and Group Control: Hand-held and/or wall switch units with up to 16 customizable pre-set conditions.

D. Manual Controls:
1. Control Functions:
a. Open: Automatically open controlled shade(s) to fully open position when button is pressed.
b. Close: Automatically close controlled shade(s) to fully closed position when button is pressed.
c. Raise: Raise controlled shade(s) only while button is pressed.
d. Lower: Lower controlled shade(s) only while button is pressed.
e. Stop shade(s) in motion by tap on any button.
2. Wall Controls: UV-stabilized visible parts, meeting ASTM D4674; furnished with backlit buttons. Provided by shade manufacturer.
a. Finish: As specified in Division 26 - Electrical.
b. Button Engraving: Manufacturer's standard engraving, unless otherwise indicated.

2.06 METAL FINISHES: PROVIDE MANUFACTURER'S STANDARD FINISH.

A. AAMA 2604, Acrylic Coating (Baked Enamel).

B. Color: As selected by Architect from manufacturers standard and custom range

C. Clear anodized per AAMA 611: Class II; AA-M12-C22-A31.

D. Field Finishing: Field Touch-up: Provide matching touch-up paint for minor touch-up of small scratches, abrasions, and fasteners.

2.07 ACCESSORIES

A. Shade pockets for gypsum board ceilings: Three-sided extruded aluminum alloy 6063 perimeter pockets to create transition between perimeter and ceiling plane.
1. Finish: Baked enamel.
2. Color: White.
3. Sizes: As shown on drawings.

4. Provide manufacturer's perimeter closure clips where shown on drawings, and per manufacturer's recommendations.
5. Provide manufacturer's bottom gypsum board trim, appropriate to thickness of gypsum board: aluminum extrusions formed to provide taping flange for gypsum board finish.
6. Provide manufacturer's splice clips: splice with set screws, galvanized steel, unfinished, used to attach joints between sections of trim.
7. Factory or field cut miters to match approved shop drawings.
8. Provide manufacturer's recommended foam gaskets, splines, fasteners, and other accessories for a complete installation.

B. Shade pockets in acoustical ceilings: See Section 09 51 00 - Acoustical Ceilings.

2.08 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
1. Maximum variation of gap at window opening perimeter: 1/4 inch, per 8 feet +/- 1/8 inch (6.35 mm, per 2438 mm +/- 3.2mm) of shade height.
2. Maximum offset from level: 1/16 inch per 5 feet (1.587mm per 1524mm) of shade width.
3. Closest distance to glass: 2 inches (50 mm) to interior face of glass
4. Allow proper clearances for window hardware and operation.

C. Provide battens in standard shades to assure proper tracking and uniform rolling of the shade-bands.
1. Construction Manager shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing standards to assure proper tracking and rolling of the shade-cloth within specified standards.
2. Battens shall be roll-formed stainless steel or tempered steel.

D. For railroaded shade-bands, provide seams in railroaded multi-width shade-bands to meet size requirements and in accordance with seam alignment as acceptable to Architect.
1. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards.
2. In absence of such standards, assure proper use of seams or battens, and assure the proper tracking of the railroaded multi-width shade-bands.

E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards.
1. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shade-bands.

F. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

2.09 MOTORIZED SHADE FABRICATION:

1. Tube Preparation: Follow manufacturer's recommendations.
2. Cut tube to required length, to fit installation width, motor end clearance, and idler end clearance.
3. Tubular Motor Preparation: Follow manufacturer's recommended fabrication procedures.
4. Fit Motor Into Tube: Follow manufacturer's recommended fabrication procedures, complying with manufacturer's recommended hardware and spacing.
    a. Use only fasteners with steel grades SAE 5 or higher. Metric fasteners shall be grade 8.8 or higher.
5. Fit end plug into other side of tube and secure.

6. Supply Cable Output: Follow manufacturers recommendations for installing axial

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and acceptance of conditions as follows:
   1. Comply with requirements of Section 01 40 00 - Quality Requirements .
   2. Examine finished openings with installer/applicator present, for deficiencies that may preclude satisfactory installation.
      a. Verify that field measurments, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are per manufacturer's requirements, and ready to receive work.
      b. Verify each roller shade assembly will fit within its corresponding window shade pocket.
   3. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Proceed with installation only after unsatisfactory conditions have been corrected.
   4. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
B. Coordinate with window installation and placement of concealed blocking to support shades.
C. Surface Preparation: Refer to manufacturer’s instructions and recommendations for preparation of substrates.
   1. Coordinate requirements for wood blocking structural support, and construction of properly sized shade pockets to ensure proper shade system installation.
   2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Clean surfaces thoroughly prior to installation.
D. Prior to installation, verify type and location of power supply. Coordinate requirements for panels, power supply, conduit, j-boxes, outlets, and wiring required for window shade motors and controls.
   1. Wire consecutive shades in parallel from shade to power source (transformer / controller.)

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.
C. Adjust level, projection, and shade centering from mounting bracket. Adjust and balance each unit drive and brake mechanism. Verify there is no telescoping of shade fabric. Ensure smooth shade operation that is easy, safe, and free from binding or malfunction throughout entire operational range.
   1. Adjust shade and shadecloth to hang flat without buckling or distortion.
   2. Replace each unit or component that does not hang properly or operate smoothly, at no additional cost to Owner.

3.04 FIELD QUALITY CONTROL

A. Field Tests and Inspections per Section 01 40 00 - Quality Requirements.
B. Test each motorized window shade to verify that controls, limit switches, interface to other building systems, and other operating components to function as intended. Adjust and correct each deficiency.

C. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Finish touch-up damaged surface finishes.
   2. Replace damaged materials and components with new if repair not acceptable to Architect.

3.05 SYSTEM STARTUP

A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

3.06 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.
B. Replace shades that cannot be cleaned to "like new" condition.
C. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.

3.07 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
C. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.
D. Training: Train Owner's personnel on operation and maintenance of system.
   1. Identify all maintenance required to maintain warranties.
   2. Use operation and maintenance manual as training reference, supplemented with additional training materials where required for adequate training.
   3. Provide minimum of two hours training by manufacturer's authorized personnel at location designated by the Owner.

3.08 PROTECTION

A. Protect installed products from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.
B. Provide initial maintenance for shade assemblies, and protect from damage during construction operations as recommended by manufacturer.
C. Remove fabricator’s and other installed protection immediately prior to Substantial Completion inspection, unless manufacturer requires otherwise.

END OF SECTION

SECTION 12 31 00
MANUFACTURED METAL CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following work:
   1. Manufactured standard and custom casework, with cabinet hardware.
   2. Special purpose units.
   3. Steel bookcases.
   4. Accessories required for a complete installation.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Keying Conference: Conduct conference prior to ordering keys. Incorporate conference decisions into keying submittal.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Component dimensions, configurations, construction details, joint details, and attachments; manufacturer's catalog literature on hardware, accessories, and service fittings, if any.
   2. Shop Drawings: Indicate casework types, sizes, locations, using large scale plans, elevations, cross sections. Include rough-in and anchors, placement dimensions and tolerances and clearances required.
   3. Samples: Two samples of each glazing material type. Minimum sample size: 6 by 6 inches.
   4. Specimen warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:

D. Closeout Submittals
   1. Submit in accordance with the following:
      a. Section 01 70 00 - Execution and Closeout Requirements.
      b. Section 01 78 00 - Closeout Submittals.
   2. Maintenance Data: Manufacturer's recommendations for care and cleaning.
   3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
      a. See Section 01 60 00 - Product Requirements, for additional provisions.
      b. Spare Parts: Three of each type and size of casework hardware, including but not limited to: pulls, hinges, and adjustable shelf supports.
         1) Provide specified spare parts to Owner prior to Substantial Completion.

2) Submit signed receipt of delivery indicating the recipient and a description of materials delivered. Submit copy of signed receipt.

c. Tools: One each of every special tool required for maintenance of manufactured metal casework.

d. Manufacturer's finish touch-up kit for each type and color of materials provided.

4. Warranty: Executed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept casework on site. Inspect on arrival for damage.

B. Coordinate size of access and route to place of installation.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer Warranty: Provide 5-year warranty against defects. Complete forms in Owner's name and register with manufacturer. Covered defects include, but are not limited to:

1. Ruptured, cracked, or stained finish coating.
2. Discoloration or lack of finish integrity.
3. Cracking or peeling of finish.
4. Failure of hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fabricated Steel Shelving: Subject to compliance with these specifications, provide products of one of the following:

1. Aurora Storage; MJ System 30 Library Shelving: www.aurorastorage.com. (Basis of Design)
2. BCI; Uniflex-B Shelving System; www.bcilibraries.com.
3. Biblo Model Shelving and Display Systems; Forte Cantilevered Shelving System; www.biblomodel.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Fabricated Steel & Laminate Shelving: Subject to compliance with these specifications, provide products of one of the following:

1. Fleetwork Furniture Group; Sheerline Collection; www.fleetwoodfurniture.com. (Basis of Design)
2. Great Openings; Trace Bookcases; www.greatopenings.com.
3. Smith System; Cascade Cubby; www.smithsystem.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 FABRICATION

A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.

B. Casework: Die-formed metal sheet; each unit self-contained and not dependent on adjacent units or building structure for rigidity; factory-fabricated, factory-assembled, and factory-finished.

1. Style: Flush overlay - square edge.
2. Steel Sheet Metal:

a. Gables, Front and Back Panels, Gusset Plates, Aprons, and Rails: 18 gauge, 0.0478 inch minimum thickness.

b. Drawers, Cabinet Floors, Shelves, Filler Panels and Drawer Dividers: 20 gauge, 0.0359 inch minimum thickness.
c. Backing Sheet to Door and Door Fronts: 22 gauge, 0.0299 inch minimum thickness.

3. Structural Performance: Provide components that safely support the following minimum loads, without deformation or damage:
   a. Base Units: 500 pounds per linear foot across the cabinet ends.
4. Corners and Joints: Without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
5. Edges and Seams: Smooth. Form counter tops, shelves, and drain boards from continuous sheets.
6. Shelf Edges: Turned down 3/4 inch on each side and returned 3/4 inch front and back.
7. Ends: Close open ends with matching construction.
8. Welding: Electric spot welded; joints ground smooth and flush.
9. Drawers and Doors: Fabricate drawer and door fronts of sandwiched sheets of sheet steel welded together and reinforced for hardware.
   a. Fill with sound-deadening core.
10. Separation: Use bituminous paint or non-conductive tape to coat metal surfaces in contact with cementitious materials, and to separate dissimilar metals.

2.03 SPECIAL PURPOSE UNITS

A. Medical/Healthcare Special Units.
   1. Style: Flush overlay - square edge.
   2. Primary Construction: Manufacturer's standard, with manufacturer's standard material countertops.

2.04 CABINET HARDWARE

A. Manufacturer's standard types, styles and finishes.

2.05 MATERIALS

A. General: Manufacturer's standard materials for units specified, unless otherwise indicated.
B. Fabricated Steel Shelving
   1. Steel framed cantilevered library shelving with perforated steel end panels and finished steel caps:
      a. Provide double-sided units with locking casters, maximum load 198 pounds per caster.
      b. Shelving unit components:
         1) Tubular steel frame: minimum 14 gage welded tube steel frame. Columns to include shelving holes at 1 inch intervals. Columns and bases to include brackets or other means to attach finished perforated steel panels and steel cap.
         2) Shelves: minimum 19 gage steel plate design to support 50 pound per square foot with a maximum deflection of 3/16 inches, 11 inch deep shelving to include 1 inch high front edge and 1-1/4 inch backstop and wire book supports.
         3) Caster unit: provide units with locking casters.
         4) Kickplates: minimum 20 gage 2-1/2 inch high kickplate.
         5) Finish: all steel components to include baked enamel finish or epoxy powder coat.
         6) Color: to be selected by Architect from manufacturer's full range of standard and premium colors.
      c. Steel end and top caps:
         1) Perforated end panels to have round holes, minimum .2 inch diameter and minimum 1 inch apart from center of each hole.
         2) Linoleum color to be selected from manufacturer's full range of available colors.

C. Fabricated Steel & Library Shelving: Steel framed shelving with laminate top and end panels.
   1. Provide double-sided units with locking casters, maximum load 198 pounds per caster.
   2. Shelving Unit components:
      a. 'U' Frame fabricated from 17-gauge 1 inch square and 18-guage 3/4 inch square tubing. Frames shall be finished with a baked enamel paint.
      b. Cabinet Top: cabinet top shall be fabricated from 3/4 inch thick 45# particleboard substrate with thermally fused melamine surface (both sides) Exposed edges of bottom panel are edge banded with 3mm thick PVC material bonded with hot-melt adhesive. Visually exposed edges of all other panels are edge banded with .018" thick PVC material bonded with hot-melt adhesive. Bottom are constructed from steel.
      c. Cabinet Mounting: Cabinet shall be caster mounted using four ball bearing, swivel-stem caster with sleeve-bearing axles. Caster assemblies shall be integral with cabinet frame on the extreme outboard convers to maintain maximum stability. Non-marking polyurethane wheel shall be 5 inches in diameter with 1-1/4 inch tread width. Total lock locking casters, where specified, shall only be two of four casters.
      d. Assembly Details: Ends and partition shall be attached to the cabinet top with 16-guage steel brackets fastened with #10 by 5/8 inch pan head screws. End panels shall be secured in frame assemblies with 2 inch long, #10 oval head screws. Frames shall be anchored to the top with 2 inch long, 1/4 inch diameter hanger bolts and helix washers. Partition shall be secured to end panels with 2 inch long #10 oval head screws and a decorative cup washer. Each shelf shall be supported with five 16-gauge steel shelf clips.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install casework, components and accessories in accordance with manufacturer's instructions.

3.02 ADJUSTING

A. Adjust operating parts, including doors, drawers, hardware, fixtures to function smoothly.

3.03 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Clean casework, counters, shelves, glass, legs, hardware, fittings and fixtures.

3.04 PROTECTION

A. Do not permit finished casework to be exposed to continued construction activity.

END OF SECTION

SECTION 12 32 00
MANUFACTURED WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting, and installing the following work:
   1. Manufactured standard and custom casework, with cabinet hardware.
   2. Special purpose units.
   3. Preparations for field-installed utilities.
   4. Accessories including, but not limited to, hardware, fasteners, and connectors.

1.02 DEFINITIONS

A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 80 inches above finished floor and all members visible in open cases or behind glass doors.

B. Semi-Exposed: Portions of casework and surfaces behind solid doors, interior surfaces of cabinet tops more than 36 inches above finished floor, security or dust panels, drawer stretchers, and underside of bottoms of cabinets more than 24 inches but less than 42 inches above finished floor.

C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation, bottoms of cabinets not less than 24 inches above finished floor, flat tops of cabinets more than 80 inches above finished floor unless visible from floor areas above, non-visible edges of adjustable shelves once installed, and cabinet end faces that abut adjacent cabinets.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.

B. ASTM. ASTM International; www.astm.org.

C. AWI. Architectural Woodwork Institute; www.awinet.org.

D. AWMAC. Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.

E. BHMA. Builders Hardware Manufacturer's Association; www.buildershardware.com.

F. CARB. California Air Resource Boar; www.arb.ca.gov.

G. CDPH. California Department of Public Health; www.cdph.ca.gov.

H. HPVA. Hardwood Plywood and Veneer Association; www.hpva.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:

B. ANSI A135.4 - Basic Hardboard.

C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

D. ASTM C1036 - Standard Specification for Flat Glass.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

F. AWI (AWS) - Architectural Woodwork Standards.

G. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.

H. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards.

I. BHMA A156.9 - Cabinet Hardware.

J. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.

K. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.

L. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting at least one week prior to the start of the work of this section; require attendance by all affected installers. Review casework installation requirements, dimensional requirements, coordination of utilities mounted in or related to casework, and manufacturer's requirements for ambient humidity and temperature in spaces prior to delivery so as not to void warranties.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals

1. Product Data: Component dimensions, configurations, construction details, joint details, attachments.
2. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements, placement dimensions and tolerances, clearances required, keying information, joint details, accessory listings, hardware locations, and schedule of finishes. Show relationship and fastening of casework to surrounding construction.
3. Cabinet Hardware Schedule: Submit cabinet hardware schedule for Architect’s approval prior to fabrication.
4. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 6 inches by 18 inches.
    a. Wood samples for color and species selection.
        1) Wood finishes for the project shall be coordinated across all exposed finished wood products and items, including finished wood products and items specified in other sections. The initial finished wood product samples submitted for selection under any such section which has been reviewed and accepted by the Architect shall serve as the basis of review and coordination for other finished wood products and items for the project.
5. Samples for Verification: Submit fully finished samples of each selected or specified finish, representative of the full range of variation of finish and grain to be expected. Minimum sample size: 6 inches by 18 inches .
6. Installer's Qualification Statement.
7. Specimen warranty.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) Post-consumer and Pre-consumer recycled content.
        2) Environmental Product Declarations (EPDs) and Health Product Declarations (HPDs).
        3) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

4) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.
5) Submit information for LEED v4 credit IEQc2 Low Emitting Materials documenting Ultra Low-Emitting Formaldehyde (ULEF) or No Added Formaldehyde (NAF) in plywood, and other sheet or composite wood products compliant with CARB (ATCM) limits.

D. Closeout Submittals
1. Submit in accordance with the following:
a. Section 01 70 00 - Execution and Closeout Requirements.
b. Section 01 78 00 - Closeout Submittals.
2. Maintenance Data: Manufacturer's recommendations for care and cleaning.
3. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
a. See Section 01 60 00 - Product Requirements for additional provisions.
b. Spare Parts: Three of each type and size of cabinet hardware, including but not limited to: pulls, hinges, adjustable shelf supports, and sets of drawer glides.
1) Provide specified spare parts to Owner prior to Substantial Completion.
2) Submit signed receipt of delivery indicating the recipient and a description of materials delivered. Submit copy of signed receipt.
c. Tools: One each of every special tool required for maintenance of manufactured wood casework.
4. Finish touch-up kit for each type and color of materials provided.
5. Manufacturer's warranty, executed in Owner's name.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's certified installer.
1. If manufacturer does not certify installers, then: company specializing in performing work of the type specified in this Section, with not less than five years of documented experience and approved by manufacturer.
B. Single Source Responsibility: Furnish casework from one manufacturer for entire project, unless otherwise acceptable to Architect.
C. Coordinate the work of this section with the following sections prior to fabrication; incorporate provisions and accommodate the work of those sections:
1. 12 36 00 - Countertops: Countertops mounted to casework; assure that countertop thickness and installed height of counters are in conformance with barrier-free accessibility requirements.
2. Division 22 Plumbing sections: service fixtures, sinks, and supply and waste piping.
3. Division 23 HVAC sections: ventilation for casework, fin-tube heating and piping mounted in proximity to casework and requiring ventilation paths within casework.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.
B. Acceptance at Site:
1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.
C. Storage:

1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

1.09 FIELD CONDITIONS

A. Ambient Conditions: Maintain interior building temperature and humidity within manufacturer's limits so as not to void warranty.

1.10 MOCK-UPS

A. Provide full size cabinet of each type in project, including: drawer base, storage base, wall cabinet, and tall wardrobe cabinet.
B. See Section 01 40 00 - Quality Requirements for additional requirements.
C. Locate where directed by Architect.
D. Accepted mock-up may remain as part of the permanent work.

1.11 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Correct defective Work within a three year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
   1. Ruptured, cracked, or stained finish coating.
   2. Discoloration or lack of finish integrity.
   3. Cracking or peeling of finish.
   4. Delamination of components.
   5. Failure of adhesives.
   6. Failure of hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Casework:
   1. Advanced Cabinet System: www.advancedcabinetsystems.com.
   2. CIF Lab Solutions; E Line: www.cifsolutions.com.
   3. Institutional Casework Inc; Campbell-Rhea Signature Series: www.iciscientific.com.
   4. Kewaunee Scientific Corp.; Signature Series: www.kewaunee.com.
   5. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 CASEWORK, GENERAL

A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
   1. Project is not pursuing AWI (QCP) Certification for manufactured wood casework.
B. Wood Veneer Faced Cabinets: Custom Grade.

2.03 FABRICATION

A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.
B. Construction: Type appropriate for selected grade, per AWI standards.
C. Structural Performance: Casework shall safely support loads listed in structural integrity testing in AWI (AWS).
D. Seismic Performance: Casework, including attachments to other work, able to withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. Component Importance Factor: Refer to Structural drawings and specifications.
E. Glazing for Doors: Clear tempered glass.

1. Glazing: With gaskets and removable stops; minimize rattling and vibration.
    a. Shop glaze glass materials using the Interior Dry method. See Section 08 80 00 - Glazing.
    b. At Nurse's office: Include window film graphics showing EpiPen and Inhaler symbols for cabinet.

F. Fittings and Fixture Locations: Cut and drill components for fittings and fixtures.

G. Hardware Application: Factory-machine casework members for hardware that is not surface applied.

H. Access Panels: Where indicated, for maintenance of utility service and mechanical and electrical components.

I. Removable back panels or interior bottoms on indicated base cabinets.

J. Fixed panels at backs of open spaces between base cabinets. Refer to Electrical drawings for device locations.

K. Provide cutouts for power receptacles where indicated on Drawings.

L. Edging: Fit shelves, doors, and exposed edges with minimum 3 mm specified edging, to match panel. Do not use more than one piece for any single length.

M. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.
    1. Where indicated on Drawings, extend exposed ends of casework to serve as filler panels, or provide separate, flush filler panels of construction to match cabinet end panels where pipe chases or voids exist behind cabinets.

N. Matching Wood Grain: Comply with requirements of quality standard for specified grade and as follows:
    1. Provide plain sliced, book matched panels at each elevation.

O. Apron Frames: Construction similar to other cabinets, with modifications.
    1. Frames fabricated from panels standard with the manufacturer. Include front and back panels, with drawer suspension framing mechanically fastened to support channels spanning between them.
    2. Apron Drawers: Manufacturer's standard drawer construction and size for apron installation. Single drawer for aprons up to 48 inches wide, two drawers for wider aprons.

P. Countertop Panel-Type Supports: Materials similar to adjacent casework, 1-1/2 inch in width, with front-to-back and toe space dimensions matching base cabinet. Designed to be secured in a concealed fashion to countertop material. Include two leveling devices per support panel.

2.04 WOOD-VENEER-FACED CASEWORK

A. Wood-Veneer-Faced Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
    1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
    2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings.
    3. Finishes: to match factory finish as specified in Section 08 14 16 - Flush Wood Doors.
        a. Exposed Exterior Surfaces: HPVA HP-1 Grade AA, White Maple, plain sliced, book-matched.
        b. Exposed Interior Surfaces: HPVA HP-1 Grade AA, White Maple, plain sliced, book-matched.

c. Semi-Exposed Surfaces: HPVA HP-1 Grade A, White Maple, plain sliced, book-matched.
d. Concealed Surfaces: Manufacturer's option.
e. Matching Wood Grain Pattern: Comply with requirements of quality standard for specified grade and as follows:
   1) Provide balance matched panels at each elevation.
f. Factory-finish all exposed and semi-exposed surfaces with the same finish.
   1) Preparation: Wood sanded smooth, free from dust and mill marks.
   2) Stain: To be selected by Architect from full range of available stains. Tinted coating is not acceptable.
   3) Coating: Clear, superior-quality, chemical-resistant acrylic urethane; applied in accordance with manufacturer instructions, force-dried, sanded and wiped clean.
   4) Coats: Provide multiple coats to achieve minimum 1.5 mil dry film thickness.
   5) Appearance: Clear matte sheen; not cloudy or muddy.

2.05 COUNTERTOPS

A. Countertops: See Section 12 36 00.

2.06 SPECIAL PURPOSE UNITS

A. Provide special purpose storage cabinets as indicated in the drawings, of same construction and finish as standard cabinet types.
   1. Mail Slot Units: Manufacturer's standard units; sizes and configurations indicated on drawings.
      a. Provide at a minimum the number of mail slots indicated in the drawings.
      b. Provide name tag holder for each slot.

2.07 CABINET HARDWARE

A. Manufacturer's standard types, styles and finishes, and as indicated below.
B. Comply with BHMA A156.9 requirements.
   1. Acceptable base materials for plated finishes include brass, bronze, and steel.
   2. Quality Grade: Minimum Type 2 (institutional), unless otherwise indicated.
C. Label Holders: Manufacturer's standard, sized to hold standard label cards, satin chromium plated over nickel on base material.
D. Locks: Provide locks on casework drawers and doors where indicated. Lock with 5 pin cylinder and 2 keys per lock.
   1. Hinged Doors: Cam type lock, satin chromium plated over nickel on base material.
   2. Keying: Key locks per directions of Architect.
      a. Review keying of all casework with Owner; key locks in accordance with Owner's direction.
      b. Key all casework except for wardrobe cabinets in each room alike; key each wardrobe cabinet individually.
      c. Key all general classroom and corridor extended learning casework alike as a group.
      d. Key casework at Administration alike as a group.
      e. Key casework at Nurse Suite alike, as a group.
      f. Key outer and inner doors at narcotics storage cabinets individually.
   3. Master Key System: All locks operable by master key.
E. Casework Key Cabinet: Provide key cabinet of sheet steel construction, with piano hinged door and lock.
   1. Mounting: Wall-mounted.

2. Location: To be determined by Owner.
3. Capacity: actual quantity of keys, plus 25 percent additional capacity.
    a. Quantity shall also include keys required for casework specified in the following Sections:
        1) Section 06 41 00 - Architectural Wood Casework.
        2) Section 12 31 00 - Manufactured Metal Casework.
4. Horizontal metal hook strips with replaceable labels covered with clear plastic.
5. Size key hooks to hold 6 keys each.
6. Finish: Baked enamel, manufacturer's standard color.
7. Key cabinet lock to be keyed to building keying system.

F. Shelves in Cabinets:
1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material, for use with drilled-in receptor holes.

G. Swinging Doors: Hinges, pulls, and catches.
1. Hinges: Semi-concealed, number required by referenced standards for width, height, and weight of door.
    a. Semi-Concealed Hinges: Installed to meet requirements of hinge design, satin stainless steel.
        1) Butt hinges installed on cabinet face, and on door edge or back; five-knuckle, projecting barrel, minimum 2-1/2 inches long.
        2) Provide two hinges for doors less than 4 feet in height and three hinges on doors over 4 feet in height.
2. Pulls: Satin chrome or stainless steel wire pulls, 4 inches wide.
    a. Pull design to comply with project's referenced accessibility requirements.
3. Catches: Mechanical catches / tension keepers as indicated on drawings.

H. Drawers: Pulls and slides.
1. Pulls: Satin chrome or stainless steel "U" shaped wire pulls, 4 inch wide centers.
2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity: heavy duty, rated at 100 pounds minimum.
    a. At file and paper storage drawers, and all general storage drawers over 42 inches in width, provide side-mount full-extension progressive action ball bearing slides rated for minimum 150 pound capacity.

2.08 MATERIALS

A. Wood-Based Materials:
1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
2. Composite Wood Panels: Containing no urea-formaldehyde resin binders.

B. Solid Wood: Clear, dry, sound, plain sawn, selected for compatible species, grain and color, no defects.

C. Semi-Exposed Solid Wood: Dry, sound, plain sawn, no appearance defects, any species similar in color and grain to exposed portions.

D. Hardwood Plywood: Veneer core; HPVA HP-1 Grade as indicated; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges with solid wood of same species as veneer.

E. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.

F. Hardwood Edgebanding: Use solid hardwood edgebanding, minimum 3 mm thick, of matching species, color, grain, and grade for exposed portions of cabinetry.

G. Hardboard: ANSI A135.4, Class 1, tempered.

H. Glass: Fully tempered float; ASTM C1036, Type 1, Quality Q3; ASTM C1048, tempered and complying with ANSI Z97.1; 1/4 inch thick minimum; exposed edges ground, and cut or drilled to receive hardware; clear.

2.09 ACCESSORIES

A. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

B. Concealed Joint Fasteners: Corrosion-resistant, standard with manufacturer.

C. Grommets: Standard plastic, painted metal, or rubber 3 inch nominal diameter grommets for cutouts, consisting of bushing liner with removable slotted cap and attached cover for slot; in black color.

D. Mirrors for wardrobe units: 10 inch by 12 inch; safety glass, framed or unframed with polished edges.

E. Coat Rods: Steel with bright chrome finish and chrome sockets. Nominal 1 inch diameter.

F. Tote Trays: Molded one-piece plastic high impact polystyrene with all top edges turned down.
   1. Furnish with label holders and in sizes indicated.

G. Pegboard Drying Racks:
   1. Stainless steel wall plate with permanently attached pegs for wall mounting with integral dip tray.
   2. Capacity: approximately 40 pegs.
   3. Pegboard size: 30 inches wide by 36 inches high.
   4. Pegs: 3/4 inch diameter polypropylene.

H. Sealant for Use in Casework Installation:

PART 3 EXECUTION

3.01 PREPARATION

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

3.02 EXAMINATION

A. Site Verification of Environmental Conditions:
   1. Do not deliver casework until the following conditions have been met:
      a. Building has been enclosed (windows and doors sealed and weather-tight).
      b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
      c. Ceiling, overhead ductwork, piping, and lighting have been installed.
      d. Installation areas do not require further “wet work” construction.

B. For Base Cabinets Installation: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 1/2 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.

C. For Wall Cabinets Installation: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
   1. Maximum variation from plane of masonry wall exceeds 1/4 inch in 10 ft and 1/2 inch in 20 ft or more, and/or maximum variation from plumb exceeds 1/4 inch per story.
   2. Maximum Variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet in any direction.

D. Verify adequacy of support framing and anchors.

E. Verify that service connections are correctly located and of proper characteristics.
F. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of installation constitutes acceptance of substrate conditions.

3.03 INSTALLATION

A. Perform installation in accordance with manufacturer's instructions.
B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.
C. Set casework items plumb and square, securely anchored to building structure.
D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
    1. Variation of Tops of Base Cabinets from Level: 1/8 inch in 10 feet.
    2. Variation of Bottoms of Wall Cabinets from Level: 1/8 inch in 8 feet.
    3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 8 feet.
    4. Variation of Adjacent Surfaces from a True Plane (Lippage): .015 inch.
    5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
F. Secure wall and floor cabinets to concealed reinforcement at gypsum board assemblies.
G. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
    1. Where base cabinets are installed away from walls or service space framing, anchor to floor at toe space at not more than 24 inches on center, and at sides of cabinets with not less than two fasteners per side.
H. Wall Cabinets: Fasten to hanging strips, and/or wall substrates. Fasten each cabinet through back, near top, at not less than 16 inches on center.
I. Install hardware uniformly and precisely.
J. Replace units that are damaged, including those that have damaged finishes.

3.04 ADJUSTING

A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

3.05 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.
B. Clean casework and other installed surfaces thoroughly.

3.06 PROTECTION

A. Do not permit finished casework to be exposed to continued construction activity.
B. Protect casework and countertops from ongoing construction activities. Prevent workers from standing on, or storing tools and materials on casework or countertops.
C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION

SECTION 12 35 53.15
MUSIC EDUCATION STORAGE CASEWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following casework:
   1. Music Instrument Storage Casework.
   2. Sheet Music Storage Casework.
   3. Accessories required for a complete installation, including but not limited to: filler panels and finished panels.

1.02 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.
B. ASCE. American Society of Civil Engineers; www.asce.org.
C. ASME. American Society of Mechanical Engineers; www.asme.org.
D. ASTM. ASTM International; www.astm.org.
E. BHMA. Builders Hardware Manufacturers Association; buildershardware.com.
F. CAL (CDPH). California Department of Public Health; https://www.cdph.ca.gov.
G. CARB. California Air Resources Board; https://ww2.arb.ca.gov.
H. LEED. Leadership in Energy and Environmental Design.
I. NAF. No Added Formaldehyde
J. NEMA. National Electrical Manufacturers Association; www.nema.org.
K. SAE. SAE International; sae.org.
L. ULEF. Ultra-Low Emitting Formaldehyde.
M. USGBC. United States Green Building Council.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ANSI A208.1 - American National Standard for Particleboard.
C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
D. ASME B18.6.1 - Wood Screws (Inch Series).
E. BHMA A156.9 - Cabinet Hardware.
F. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
G. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.
H. NEMA LD 3 - High-Pressure Decorative Laminates.
I. SAE J78 - Steel Self-Drilling Tapping Screws.

1.04 SUBMITTALS

A. Construction Submittals
   1. Product Data: Manufacturer’s data sheets, installation instructions, and maintenance recommendations.
   2. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency.
   3. Shop Drawings: Prepared by manufacturer. Include elevations showing casework components, details of each condition of installation, and types and locations of hardware

and fasteners. Show fabrication and installation details. Include plans, elevations, sections, details, and attachments to other work.

4. Samples: For each color and finish for each exposed casework component.

B. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. Include documentation of:
        1) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.
        2) VOC content and CAL (CDPH SM) Emissions testing compliance of paints and coatings.
        3) Submit information for LEED v4 credit IEQc2 Low Emitting Materials documenting Ultra Low-Emitting Formaldehyde (ULEF) or No Added Formaldehyde (NAF) in plywood, and other sheet or composite wood products compliant with CARB (ATCM) limits.

C. Closeout Submittals

1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
2. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.
3. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Source Limitations:

1. Obtain the products of this Section through one source from a single approved manufacturer

B. Products of this Section must be installed by the approved manufacturer. Contracting with a separate installer is not acceptable.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle music education storage casework in accordance with manufacturer’s recommendations. Ship to jobsite only after roughing-in, painting work, and other related finish work has been completed and installation areas are ready to accept casework and recommended temperature and humidity levels will be maintained during the remainder of construction.

B. Environmental Requirements: Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least one week.

1.07 ADMINISTRATIVE REQUIREMENTS

A. Administrative requirements per Section 01 30 00, and as follows:

1. Coordinate installation of blocking and supports in frame wall assemblies under work of other sections where required for anchoring of music education storage casework.

1.08 WARRANTY

A. Special Warranty: Manufacturer's written warranty indicating manufacturer’s intent to repair or replace components of music education storage casework that fail in materials or workmanship within 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Modular instrument storage casework with integral bases, adjustable levelers, and through-bolted fastening, enabling Owner reconfiguration of unit layout.
   1. Acoustically enhanced instrument storage casework finished with interior lining of sound-absorbent material providing sound absorption and noise reduction properties.

B. Uniform storage casework with integral bases, adjustable levelers, and through-bolted fastening, enabling Owner reconfiguration of unit layout.

C. Sheet music storage casework in wheeled retractable units providing high-density storage, adjustable to fit most sizes of published sheet music, enabling Owner reconfiguration of unit layout.

2.02 PERFORMANCE REQUIREMENTS

A. Storage Casework Component Load Capacities:
   1. Storage Casework Wire-Grille Door Hinge: Each weld capable of resisting 400 lbf (1779 N) pull test without visible damage or permanent deformation.
   2. Storage Casework Full Grille Door Hinge: Full length door capable of supporting 315 lbs. Through open and close cycle without permanent damage.
   3. Uniform Storage Casework Garment Hanger Rods: Capable of supporting vertical load applied uniformly along width of unit of 200 lbf (890 N).
   4. Sheet Music Storage Casework: Units shall support 35 lb/lin. ft. (52 kg/m) uniform shelf loading with maximum 1/16 inch (1.6 mm) deflection.

B. Seismic Performance: Comply with ASCE 7 , "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads" and with State Building Code based upon seismic design criteria indicated.

2.03 MATERIALS

A. Materials Meeting Sustainable Design Requirements:
   1. No Added Urea Formaldehyde Products: Provide music education storage casework made with composite products and adhesives with no urea formaldehyde added.

B. Particleboard: ANSI A208.1, minimum 43 lb/cu. ft. (689 kg/cu. m) density, with no urea formaldehyde added.

C. Decorative Laminates:
   1. High-pressure decorative laminate VGS (.028), NEMA LD 3.
   2. High-pressure cabinet liner CLS (.020), NEMA LD 3.
   3. Thermally fused melamine laminate, NEMA LD 3, color matched 5 with White.
   4. Laminate Adhesive: Water based low Volatile Organic Compound (VOC), 7 nontoxic, PVA adhesive.

D. Polyethylene Shelves: High-density, one-piece, blow-molded or polyethylene, with radiused front edge, for abuse-resistant shelves.

E. PVC Edge Banding: Radiused PVC extrusions, 3 mm thick.

2.04 INSTRUMENT STORAGE CASEWORK

A. General: Provide through-ventilating instrument storage and robe and uniform storage casework meeting requirements in System Description and Performance Requirements Articles.

B. Side Panels and Divider Panels: Particleboard thermoset panel, 3/4 inch (19 mm) thick. Side panels machined to accept unit-to-unit through-bolting.
C. Grille Doors: Bright basic steel wire, 5/16 and 3/16 inch (7.9 and 4.8 mm) diameter, or 5/16 and 1/4 inch (7.9 and 6.3 mm) diameter for AcoustiCabinets, with full 360 degree welds at T-joints.
    1. Provide for Instrument Storage Casework unless indicated otherwise.
D. Panel Doors: Particleboard thermoset panel, 3/4 inch (19 mm) thick, inset-type. Color: to be selected from Manufacturer's complete range of standard and non-standard colors.
    1. Provide for Uniform Storage Casework, unless indicated otherwise.
E. Open Casework: Provide casework without doors.
    1. Provide for casework indicated.
F. Panel Edge Banding: 3 mm thick, heat-bonded, with radiused and profiled edges and corners.
G. Shelving: Sized with adequate gap between shelving and casework side panels to allow air movement inside casework.
    1. Up to 27 inches (686 mm) wide: Removable molded polyethylene shelf, with impact-resistant, radiused front edge, mounted to cabinet wall with self-locking clip.
    2. Over 27 inches (686 mm) wide: For large instrument casework: Removable formed polyethylene shelf, ribbed, with high-impact-resistant, radiused front edge, supported by steel tube frame.
H. Flag Storage and Garment Ring: 5/16 inch (8 mm) diameter steel rod bolted to steel center post with 10 gauge steel brackets.
I. Flag Storage Bottom Shelf Pad: Carpet pad, adhered to steel shelf.
J. Casework Panel Color: As selected by Architect from manufacturer's standard colors.

2.05 HIGH DENSITY ROLLOUT SHEET MUSIC STORAGE CASEWORK

A. End Panels: Particleboard thermoset panel, 3/4 inch (19 mm) thick.
B. Shelving: Plywood thermoset panel, 3/4 inch (19 mm) thick. 7-shelf unit with 4 adjustable and 3 fixed shelves, with metal book supports.
C. Exposed End Cover Panels: Particleboard thermoset panel, 3/4 inch (19 mm) thick.
D. Top Closure/Storage Panels: Plywood thermoset panel matching end panels.
E. Casters: 4 rigid 8 inch (203 mm) diameter casters.
F. Guide Frame: 1 by 1 inch by 16 gauge / 0.053 inch (25.4 by 25.4 by 1.3 mm) steel tubes, factory finished, with limiting cable, bumpers, and hat channel wall anchor.
G. Casework Panel Color: As selected by Architect from manufacturer's full range of standard and non-standard colors.

2.06 ACCESSORIES

A. Filler Panels and Closure Kits: 3/4-inch (19 mm) thick particleboard thermoset panels matching cabinet side panels. Provide the following, cut to fit field conditions, where indicated:
    1. Wall filler between cabinet side and wall.
    2. Top filler between cabinet top and wall.
    3. Top of cabinet closure panel between cabinet and finished ceiling or soffits.
    4. Finished back panel for exposed cabinet backs.

2.07 HARDWARE

A. Butt Hinges: 2-3/4 inch (70 mm), 5-knuckle steel hinges made from 0.090 inch (2.29 mm) thick metal, BHMA A156.9, Grade 1, with powder-coated finish, through-bolted to door and side panels and welded to grille door frames. Provide 2 hinges on compartment doors, and 4 hinges on full-height doors.
B. Slide Latch: 0.105 inch (2.67 mm) min. thickness steel, with padlock eye, powder-coat finish, through-bolted to panel door and side panel and welded to grille door frames. Latches securely

without padlock. Provide with clear plastic label holder with numbering system. Padlocks furnished by Owner.

C. Panel Connectors: 1/4–20 by 1.77 inch (45 mm) panel connectors, with steel thread inserts, powder coated to match panels.

D. Cabinet Levelers: Leveling glides with 3/8 inch (9.5 mm) diameter threaded steel rod in steel corner brackets, minimum two each per cabinet side, accessible from within unit, and concealed in completed installation.

E. Fasteners: Manufacturer-recommended fasteners for casework substrate and project performance requirements, consisting of one or more of the following:

1. Sheet Metal Screws: SAE J78, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
2. Wood Screws: ASME B18.6.1.
3. Expansion Anchors in Concrete and Concrete Masonry Units: Carbon-steel, zinc plated.

2.08 FINISHES

A. Steel Sheet, Steel Wire, and Exposed Fasteners: Urethane-based electrostatic powder coating, color as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine casework installation areas for compliance with requirements for installation tolerances, location of blocking and other anchoring reinforcements, and other existing conditions affecting installation and performance of casework. Proceed with casework installation upon correction of unsatisfactory conditions.

3.02 CASEWORK INSTALLATION

A. Install plumb, level, and true; using integral levelers. Install in accordance with manufacturer’s recommendations and approved submittals.

1. Install seismic bracing and fastening in accordance with approved shop drawings.

B. Install hardware uniformly and precisely. Set hinges snug and flat. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

C. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind and close with uniform reveals.

3.03 CLEANING AND PROTECTING

A. Repair or replace defective work at direction of Architect upon inspection.

B. Clean casework surfaces. Touch up, refinish, or replace damaged components in a manner acceptable to Architect.

C. Turn over operation and maintenance instructions to Owner.

END OF SECTION

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Plastic laminate countertops.
   2. Accessories needed for a complete installation, including but not limited to fasteners, adhesives, and sealants.

1.02 ABBREVIATIONS AND ACRONYMS

A. ANSI. American National Standards Institute; www.ansi.org.
B. APA. The Engineered Wood Association; www.apawood.org.
C. ASTM. ASTM International; www.astm.org.
D. AWI. Architectural Woodwork Institute; www.awinet.org.
E. AWMAC. Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
F. CDPH. California Department of Public Health; www.cdph.ca.gov.
G. IAPMO. International Association of Plumbing and Mechanical Officials; www.iapmo.org.
H. ISFA. International Surface Fabricators Association; www.isfanow.org.
I. NEMA. National Electrical Manufacturers Association; www.nema.org.
J. PS. Voluntary Product Standard; www.nist.gov.
K. SEFA. Scientific Equipment and Furniture Association; www.
L. WI: Woodwork Institute (WI); www.woodworkinstitute.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. ANSI A208.1 - American National Standard for Particleboard.
C. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications.
D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition.
G. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
H. IAPMO Z124 - Plastic Plumbing Fixtures.
I. ISFA 2-01 - Classification and Standards for Solid Surfacing Material.
J. NEMA LD 3 - High-Pressure Decorative Laminates.
K. PS 1 - Structural Plywood.
L. SEFA 2 - Installations.
M. SEFA 3 - Laboratory Work Surfaces.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Refer to Section 01 30 00 - Administrative Requirements, and the following:
B. Coordination: per the requirements of Section 01 31 14 - Coordination.
C. Preinstallation Meeting:
   1. See Section 01 70 00 - Execution and Closeout Requirements.
   2. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; Attendance by all relevant installers of related work shall be required.

3. Review mounting conditions, installation and storage instructions, fabrication requirements, seaming and protection measures.

D. Sequencing and Scheduling: per Section 01 32 16 - Construction Progress Schedule.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals

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. Specimen warranty.
2. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other related sections. Indicate dimensions, thicknesses, required clearances, tolerances, colors, finishes, fabrication details, field jointing, adjacent construction, design load parameters, methods of support, integration of plumbing components, and anchorages.
3. Selection Samples: For each finish product where color is not specified, or where basis of design product is not proposed, color chips representing manufacturer's full range of available colors and patterns.
4. Verification Samples:
   a. For each countertop finish product, minimum size 6 inches square, representing actual product, color, texture, patterns and finish.
   b. For each type of wood nosing, minimum size 8 inches long, representing actual product, species, dimensions, and finish.
5. Test Reports:
   a. Chemical resistance testing, showing compliance with specified requirements.
   b. For combustible materials:
      1) Flame spread and smoke developed (ASTM E84).
6. Installer's qualification statement.
7. Specimen warranties.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
   a. Include documentation of:
      1) Post-Consumer and Pre-Consumer Recycled Content.
      2) Regional Materials: Extracted, manufactured, and purchased within 100 miles.
      3) Environmental Product Declarations (EPD).
      4) Health Product Declarations (HPD).
      5) VOC content and CAL (CDPH SM) Emissions testing compliance of adhesives and sealants.

D. Closeout Submittals

1. Submit in accordance with the following:

a. Section 01 70 00 - Execution and Closeout Requirements.
b. Section 01 78 00 - Closeout Submittals.

2. Warranty:
   a. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
3. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.
4. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   a. See Section 01 60 00 - Product Requirements, for additional provisions.
   b. Extra polishing cream for cast solid surface countertops: 16 oz.
   c. Six patch kits for each type and color of cast solid surface countertop.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store products in a flat orientation in a dry place that is not exposed to exterior elements.
C. Protect products against damage from moisture and sunlight.
D. Store products in area of installation for a minimum of 24 hours prior to installation.
E. Before installing products, permit them to reach room temperature.

1.08 FIELD CONDITIONS

A. Do not install products until spaces are enclosed and weatherproof. 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.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. For cast solid surface countertops, correct defective work within a five year period after date of Substantial Completion.
   1. Provide five year manufacturer warranty for fading.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Quality Standard: Custom Grade minimum, or Premium Grade where counters are installed to casework that is Premium grade as specified in Section 06 41 00 - Architectural Wood Casework and Section 12 32 00 - Manufactured Wood Casework.
B. Quality Standard: SEFA 3 for laboratory worksurfaces.
C. Plastic Laminate Countertops CT-PL: High-pressure decorative laminate (HPDL) sheet bonded to plywood / MDF substrate.
   1. Manufacturers (Refer to drawings for Basis of Design): Subject to compliance with these specifications, provide products of one of the following:
      a. Formica Corporation: www.formica.com. (Basis of Design)
      b. Panolam Industries International, Inc: www.panolam.com.
      c. Wilsonart: www.wilsonart.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
3. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
4. Finish: Matte or suede, gloss rating of 5 to 20.
5. Exposed Edge Treatment: Hardwood nosing as indicated on drawings, natural spar varnish finish; back and end splashes with square top covered with matching laminate.
6. Back and End Splashes: Same material, same construction.

D. Wood Countertops: One-piece, glued-laminated under pressure.
1. Thickness: 1-1/4 inch, minimum.
2. Species: Maple; clear grade.
3. Exposed Edges: Rounded to approximately 3/8 inch radius.
4. Back and End Splashes: Same material, same construction; 3/4 inch thick, square edges.
5. Finish: Sanded smooth; two coat boiled linseed oil rubbed in with 48 hours between coats.

E. Chemical-Resistant Cast Epoxy Resin Countertops: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components.
1. Manufacturers:
a. Durcon, Inc: www.durcon.com.
b. Prime Industries, Inc: www.piilab.com.
c. Kewaunee Scientific Corp.; Kemresin: www.kewaunee.com.
d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2. Flat Surface Thickness: 1-1/4 inch, nominal.
3. Flammability: Self-extinguishing, when tested in accordance with ASTM D635.
4. Surface Finish: Smooth, non-glare.
5. Color: Black.
6. Exposed Edge Shape: 1/8 inch bevel chamfer.
7. Drip Edge: Drip groove 1/8 inch wide and deep, located 1/2 inch back from edge on underside of all exposed edges.
8. Back and End Splashes: 4 inch height, unless otherwise indicated. Same material, same thickness; separate for field attachment.
9. Sinks: Same material, same color; molded in one place with sloped rabbeted lip sealed to countertop; bottom sloped to outlet; molded outlets; drain outlet located in back corner.
a. Sinks shall be compliant with ADA and State accessibility standards.
b. Sides and Ends: 1/2 inch minimum thickness.
c. Bottoms: 5/8 inch minimum thickness.
d. Interior Corners: 1 inch minimum radius.
e. Clamping collars for 1-1/2 or 2 inch diameter waste pipe, for sealed but not permanent connection.

F. Cast Solid Surface Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
1. Flat Sheet Thickness: 1/2 inch, minimum.
2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; proprietary type resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color

and pattern consistent throughout thickness. Stain resistant to domestic chemicals and cleaners.

a. Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1) Dupont USA: www.corian.com.
   2) LX Hausys America, Inc; HI-MACS 12mm: www.lxhausysusa.com. (Basis of Design)
   3) Wilsonart: www.wilsonart.com.
   4) Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

3. Polishing Cream: Compatible polishing cream to achieve specified sheen to gel coat.
4. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
5. Sinks and Bowls: Solid surface integral castings; as indicated in Plumbing Drawings and Section 22 00 10. Coordinate counter cut-outs with approved plumbing fixtures. Minimum 3/4 inch wall thickness; comply with IAPMO Z124.
   a. Sinks and bowls shall be compliant with ADA and State accessibility standards.
   b. Size and Shape: As indicated in drawings.
6. Color and Pattern: As indicated on drawings.
7. Adhesive: manufacturer-recommended type, cartridge dispensed.
8. Back and End Splashes: Same sheet material, square top; minimum 4 inches high, unless indicated otherwise in drawings.

2.02 MATERIALS

A. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.
   2. Provide wood harvested within a 100 mile radius of the project site.

B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

C. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.

D. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.

E. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

F. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 ACCESSORIES

A. Fixed prefabricated, pre-engineered countertop support brackets:
   1. Material: Steel, minimum 3/8 inch thick.
   2. Size: Length of countertop overhang less 2 inches.
   3. Bracket spacing: See drawings, and maximum spacing shall not exceed the most stringent of: countertop and bracket manufacturers' recommendations and recommendations of AWI/AWMAC/WI (AWS), as applicable to countertop type and assembly.
   4. Finish: Manufacturer's standard, factory-applied, textured powder coat.
   5. Color: Black.

2.04 FABRICATION

A. Fabricate countertops and splashes in the largest sections practicable, except as otherwise noted below, with top surface of joints flush.

1. Join lengths of tops using best method recommended by manufacturer.
2. Fabricate to overhang fronts and ends of cabinets 3/4 inch except where top butts against cabinet or wall, or where otherwise indicated on drawings.
3. Verify size and location of openings required prior to fabrication. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
4. Joints in countertops shall be sealed water-tight, with corrosion-resistant caulk as recommended for applicable countertop type by countertop manufacturer

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: As indicated on drawings.

C. Chemical-Resistant Cast Epoxy Resin and Cast Solid Surface: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
1. Integral sinks: Shop-mount securely to countertop with adhesives, using undermount configuration, as per manufacturer's instructions, and as detailed on drawings.
2. Fabricate components by mold to achieve shape configuration.
3. Installation shall take place without field cutting or drilling of chemical-resistant cast epoxy resin and cast solid surface materials.

D. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match, in compliance with applicable accessibility rules for projecting items.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.
D. Verify that field measurements are as indicated.
E. Verify that joint preparation and affected dimensions are acceptable.
F. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 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.
C. Provide anchoring devices for installation.
D. Furnish support brackets designed for concealed attachment to wall surfaces for installation with wall framing and finishes. Verify placement is in accordance with bracket engineering and spacing requirements.

3.03 INSTALLATION

A. Install laboratory worksurface countertops in compliance with requirements of SEFA 2.
B. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
C. Install components in accordance with shop drawings and manufacturer's instructions.

D. Align work plumb and level.
E. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
F. Attach wood countertops using screws with minimum penetration into substrate board of 5/8 inch.
G. Attach epoxy resin countertops using compatible adhesive.
H. Installation of cast solid surface and epoxy resin countertops shall take place without field cutting or drilling.
I. Joints shall be sealed water-tight, with corrosion resistant caulk, as recommended by applicable countertop manufacturer.
J. Seal joints between back/end splashes and vertical surfaces.
K. Replace for Architect's acceptance any material that is chipped, warped, hazed, discolored, or otherwise damaged as a result of installation or fabrication methods.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 8 feet, maximum.
B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
C. Field Joints:
   1. Plastic Laminate Countertops: 0.025 inch maximum at Custom grade, 0.012 inch at Premium grade.
   2. Wood Countertops: 0.025 inch maximum at Custom grade, 0.012 inch at Premium grade.
   3. Cast Solid Surface Countertops: 0.075 inch maximum for Custom grade, 0.050 inch at Premium grade.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.
B. Polish the followingcountertops in accordance with manufacturer's instructions.
   1. Cast solid surface countertops.
   2. Integral sinks.

3.06 PROTECTION

A. Protect installed products from damage/staining during subsequent construction activities, until completion of project.
B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 12 48 13
ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following work:
   1. Entrance floor grilles and grating assemblies.
   2. Floor mats.
   3. Accessories required for a complete installation.

1.02 ABBREVIATIONS AND ACRONYMS

A. ASTM. ASTM International; www.astm.org.
B. CDPH. California Department of Public Health; www.cdph.ca.gov.
C. CFR. Code of Federal Regulations; www.gpo.gov.
D. CRI. Carpet and Rug Institute; www.carpet-rug.org.
E. EPA. United States Environmental Protection Agency; www.epa.gov.
F. FM. FM Approvals; www.fmapprovals.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.
C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
D. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
E. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
F. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
G. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
H. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
I. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.2.
J. CRI (GLP) - Green Label Plus Testing Program - Certified Products.
K. EPA Method 24 - Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings.
L. FM 6063 - Approval Standard for Diesel Fuel Maintenance Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination per Section 01 31 14 - Coordination and the following:
   1. Coordinate with Section 03 30 00 - Cast-in-Place Concrete for embedded anchor items, frame assembly templates, and grouting in frames.
   2. Coordinate with Section 09 30 00 - Tiling for tile work abutting frame assemblies and grouting between frames and tile.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Shop Drawings: Indicate dimensions and details for recessed frame.
      a. For recessed frames located within a dimensionally restricted area, show dimensions of space within which the frame will be installed.
      b. Items penetrating floor grids and frames including, but not limited to, door control devices.
      c. Divisions between grid sections.
      d. Perimeter floor molding.
   2. Initial Selection Samples: Submit samples showing complete range of standard, non-standard, and custom colors, textures, and finishes available for each material used.
   3. Verification Samples: Submit three samples, 12 by 12 inches in size illustrating pattern, color, finish, and edging.
   4. Manufacturer's written specifications and lab documents for any physical testing.
   5. Installation recommendations for each type of substrate as specified in entrance floor mat manufacturer's installation guidelines and/or CRI 104, where applicable.
   6. Specimen warranty.
C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Post-Consumer and Pre-Consumer Recycled Content.
D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
   2. Warranty Documentation: Executed warranties.
   3. Maintenance Data: Include cleaning instructions, and stain removal procedures.

1.06 QUALITY ASSURANCE

A. Regulatory Agency Approvals: Provide products complying with the following:
   1. Flammability in accordance with ASTM E648, Class 2, Critical Radiant Flux, minimum 0.22 watts/m2.
   2. Slip resistance in accordance with ASTM D2047, Coefficient of Friction, minimum 0.60 for accessible routes.
B. Single Source Responsibility: Furnish Entrance Floor Grid and Frame system materials from one manufacturer for each type for entire Project, unless otherwise acceptable to Architect.
C. Coordinate with Section 03 30 00 - Cast-in-Place Concrete for embedded anchor items, frame assembly templates, and grouting in frames.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s instructions and recommendations, Section 01 60 00 - Product Requirements, and as follows:

1. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.08 FIELD CONDITIONS

A. Field Measurements: Check actual openings for grids/grids by accurate field measurements before fabrication. Record actual measurements on final shop drawings.
   1. Coordinate fabrication schedule with construction progress to avoid delay of work.

B. Recess Application: Coordinate frame installation with concrete and/or tile setting bed construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is complete.

1.09 WARRANTY

A. Manufacturer / Special Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.
   1. Product: Provide manufacturer's written 2 year material warranty on grilles, gratings, grids, and frames.
   2. Warranty period shall begin on date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Entrance Floor Grilles and Gratings (WOG-1): Subject to compliance with these specifications, provide products of one of the following:
   1. Construction Specialties, Inc; Gridline: www.c-sgroup.com.
   2. Matter Surfaces: Grate Design Track; www.mattersurfaces.com. (Basis of Design)
   3. Reese Enterprises, Inc; PerfecMat aluminum hinge: www.reeseusa.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 ENTRANCE FLOOR GRILLES AND FRAMES

A. Entrance Floor Grilles: Recessed extruded aluminum grille assembly with nominal 1 inch wide tread strips running perpendicular to traffic flow, slots between treads, and perimeter frame forming sides of recess; grille hinged for access to recess.
   1. Recess Depth: 1/2 inch set into floor finish without depressions. Transition strips to be provided by flooring contractor.
   2. Tread Surfaces: Alternating polypropylene brush.
   3. Colors: As indicated on drawings; or if not indicated, then as selected by Architect from manufacturer's full range of standard and non-standard colors.
   4. Length in Direction of Traffic Flow: As indicated on drawings.
   5. Width Perpendicular to Traffic Flow: As indicated on drawings, or if not shown, full width of entrance door opening.
   6. Frame: Anodized aluminum for installation on surface of concrete using mechanical fasteners, against adjacent finishes with minimal exposed trim.
      a. ASTM B221 aluminum alloy 6063-T5/T6 or ASTM B308/B308M aluminum alloy 6061-T6.
      b. Coat surfaces in contact with concrete with manufacturer's standard protective primer coat.
   7. Mounting: top of walking surface level with adjacent floor finish.

8. Structural capacity: capable of supporting a rolling load of 500 pounds without permanent deformation or noticeable deflection.
9. Vibration resistant fabrication: all member welded, riveted, or bolted; no snap or friction connections.

2.03 INSTALLATION ACCESSORIES:

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Trowelable Adhesives: Water-resistant, mildew-resistant, nonstaining, premium grade, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
   1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Adhesives shall comply with the testing and product requirements of the CAL (CDPH SM).
   3. Adhesives shall comply with the testing and product requirements of the CRI (GLP) Program.

C. Non-Trowelable Adhesive: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation where slab moisture does not exceed 95 percent per ASTM F2170 or 10 lbs per ASTM F1869. Each carpet tile must be adhered to the subfloor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
   1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
      a. Verify that field measurements, substrates, floor openings and recesses, embedded structural supports, tolerances, levelness, plumbness, moisture content level, cleanliness and other conditions are within acceptable tolerance requirements of the manufacturer, and ready to receive work.
      b. Proceed with installation only after unsatisfactory conditions have been corrected.
      c. Verify that floor opening for mats are ready to receive work.

3.02 PREPARATION

A. Surface Preparation: Refer to manufacturer’s instructions and recommendations for preparation of substrates.

B. Apply heavy coating of bituminous paint to metal of frames, if unprotected, which will be in contact with concrete.

C. Grids: Verify size of floor recess before fabricating mats.

D. Vacuum clean floor recess.

3.03 INSTALLATION

A. General: Install Entrance Floor Grids and Frames according to the Drawings, submittals, manufacturer's instructions, and as follows:
   1. Install frames to achieve flush plane with finished floor surface.
   2. Shim and grout frame into oversize recess.
   3. Interface with other work:

a. Coordinate with Section 03 30 00 - Cast-in-Place Concrete for embedded anchor items, frame assembly templates, and grouting in frames.
b. Coordinate top of grid elevation with frame and floor elevations to provide proper foot cleaning, and to avoid all possibility of tripping hazards.
c. Coordinate top of insert and grid surfaces with bottom of doors that swing across to provide ample clearance between door and grid/grid.
d. Defer installation until just before Substantial Completion or Owner occupancy of building, whichever comes first.

4. Contractor shall provide application of self-leveling compound, to achieve proper elevation at recess for selected products.

3.04 TOLERANCES

A. Maximum Gap Formed at Recessed Frame From Mat Size: 1/4 inch.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Remove, repair and reinstall or restore-in-place damaged items prior to inspection for Substantial Completion.
   1. Replace damaged materials and components with new if repair not acceptable to Architect.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.07 PROTECTION

A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.
B. After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recess, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of substantial completion.
C. Defer installation of floor grids/grids until just prior to Substantial Completion.

END OF SECTION

SECTION 12 66 13
TELESCOPING BLEACHERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricating, furnishing, delivering, and installing the following telescoping bleachers work:
   1. Telescoping bleachers.
   2. Electric motor operators, controls, and internal wiring.
   3. Accessories for a complete installation, including but not limited to end of row guardrails, aisle handrails, flex-row barrier-free seating, skirt panels, motion monitor, scorer's table, fillers and closures, end curtains, fasteners, and anchorage.

1.02 ABBREVIATIONS AND ACRONYMS

A. ADA: Americans with Disabilities Act; www.ada.gov.
B. APA: The Engineered Wood Association; www.apawood.org.
C. AWS: American Welding Society; www.aws.org.
D. CFR. Code of Federal Regulations; www.ecfr.gov.
E. CMR. Code of Massachusetts Regulations: www.mass.gov/code-of-massachusetts-regulations-cmr.
F. ICC. International Code Council; www.iccsafe.org.
G. ICC-ES. ICC Evaluation Services, LLC; www.icc-es.org.
H. MAAB. Massachusetts Architectural Access Board: www.mass.gov/orgs/architectural-access-board.
I. MSBC. Massachusetts State Building Code; www.mass.gov/massachusetts-state-building-code-780-cmr.
J. NFPA: National Fire Protection Association; www.nfpa.org.
K. PS. Voluntary Standard of National Institute of Standards and Technology; www.nist.gov.
L. UL. UL Solutions: www.ul.com.

1.03 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
B. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.
C. 521 CMR - Architectural Access Board.
D. 780 CMR - Massachusetts State Building Code.
E. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification.
F. AWS D1.1/D1.1M - Structural Welding Code - Steel.
G. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel.
H. ICC 300 - Bleachers, Folding and Telescopic Seating, and Grandstands.
I. NFPA 70 - National Electrical Code.
J. NFPA 102 - Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures.
K. PS 1 - Structural Plywood.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Construction Submittals
   1. Product Data: Manufacturer's data sheets on each product to be used, including:

a. Preparation instructions and recommendations.
b. Storage handling and requirements.
c. Installation methods.
d. Use limitations and recommendations.
e. ICC-ES certification.
f. Finishes.
g. Graphics Layout Drawings: Indicate positioning and size of custom graphic artwork across fronts of bleachers when in stored position.
h. Graphics Layout Drawings: Indicated pattern of contrasting seat colors.

2. Shop Drawings: Complete layout with dimensions, seat heights, row spacing and rise, aisle widths and locations, points of connection to substrate, assembly dimensions, and material types and finishes.
   a. Provide drawings customized to this project.
   b. Indicate bleachers placed in installed locations, including field dimensions.
   c. Include overall dimensions in both closed and open positions.
   d. Include Professional Engineer certification.
   e. Wiring Diagrams: Show locations of motors, electrical wiring, and rough-in connections.
3. Installer qualifications.
4. Engineer qualifications.
5. Welders' Qualification: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
6. Selection Samples: For each material for which color selection is required, submit samples, 2 by 2 inches in size, illustrating colors and finishes available.
7. Verification Samples: For each custom colored finish, submit samples of actual finish or product, for verification of color selection.
8. Test and Evaluation Reports:
   a. Submit a copy of a telescopic load test, observed by a qualified independent testing laboratory and certified by a registered Professional Structural Engineer, verifying the integrity of the manufacturer's geometry design and base structural assumptions.
   b. Submit ICC-ES evaluation report.
9. Specimen warranties.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
      a. Include documentation of:
         1) Recycled content: post-consumer and pre-consumer recycled content.

D. Closeout Submittals
   1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.

2. Operation and Maintenance Data: Manufacturer's operation and maintenance instructions, including annual inspection and maintenance and bi-annual inspection by a Professional Engineer or manufacturer factory service personnel.
3. Manufacturer Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
4. Installer Warranty: Submit installer warranty and ensure that forms have been completed in Owner's name and signed by installer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Approved by manufacturer. Company with a minimum of three years of experience specializing in work of the type required by this section.
B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M, AWS D1.3/D1.3M, and no more than 12 months before the start of scheduled welding work.
C. Engineer Qualifications: Certification by a professional engineer, registered in the state of Massachusetts, and approved by the manufacturer, that the equipment to be supplied meets or exceeds the design criteria of the Specification.
D. Single Source Responsibility: Furnish telescoping bleacher system from one manufacturer for the entire project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver telescopic bleacher system in manufacturer's packaging, clearly labeled with manufacturer's name and content.
B. Store, in original packaging, under cover and elevated above grade.
C. See Section 01 60 00 - Product Requirements for additional requirements.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Manufacturer Warranty: Provide manufacturer's standard warranty.
C. Installer Warranty: Correct defective work within a three year period after date of Substantial Completion. Replace parts that fail under normal use at no extra charge to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Telescoping Bleachers: Subject to compliance with these specifications, provide products of one of the following:
1. Hussey Seating Company; MAXAM Telescopic Gym Seat System, with Courtside XCS12 seats: www.husseyseating.com. (Basis of Design)
2. Interkal LLC; Model Sculptural Seat Modules (SSM), 10-1/4 inch rise: www.interkal.com.
3. Irwin Telescopic Seating Company; Model Series 4500 understructure, 10 inch rise: www.irwintelescopicseating.com.
4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 TELESCOPING BLEACHERS

A. Telescoping Bleachers: Factory assembled tiered benches that retract horizontally into depth approximately the same as a single row depth, with fixed seats mounted on leading edge of platforms.
1. Provide a design certified by a licensed Professional Engineer licensed in Massachusetts.

2. Design to comply with applicable requirements of NFPA 102 and requirements of code authorities having jurisdiction; where conflicts between requirements occur, comply with whichever is more stringent.
3. Design with solid fascia (riser) or seat fronts that conceal interior mechanisms when fully retracted, fitting tightly enough to prevent climbing up face; at front row provide key locked, hinged fascia (skirt) to cover gap between seat riser/fascia and floor.
4. Standard Extension: Top row fixed to floor or wall.
5. Cutouts: Fit units to irregular wall surfaces, columns, pilasters, roof drain leaders, and other obstructions; take field measurements prior to fabrication.
6. Operation: Motor operated.

B. Design Loads: Design to comply with MSBC 780 CMR and withstand the following loading conditions:
1. Live Load on Structural Supports: 100 psf, minimum, of gross horizontal projection.
2. Live Load on Seats and Walking Surfaces: 120 pounds per linear foot.
3. Live Load on Walking Surfaces: 300 pounds, on an area of 4 square inches.
4. Lateral Sway Stress on Structural Supports: 24 pounds per linear foot of seat plank.
5. Perpendicular Sway Stress on Structural Supports: 10 pounds per linear foot of seat plank.
6. Telescoping bleacher system to be supplied shall have a current evaluation report issued by ICC-ES certifying that it meets all structural design requirements of ICC 300, including all specified load combinations.

C. Dimensions:
1. See drawings for quantities, and configurations of rows and tiers, and overall dimensions.
2. Rise Per Row: 9-5/8 inches nominal, or as stated in MANUFACTURERS paragraph above.
3. Row Spacing: 24 inches.

D. Structural Supports: Steel or aluminum; manufacturer's standard wheeled carriages supporting each tier separately, with moving parts permanently lubricated and metal parts cushioned to prevent metal-to-metal contact during operation.
1. Design so that each row carriage so that it will individually support the design loads and is self supporting when fully assembled without dependence on platform panels or boards, seats, or fascia.
2. Welding: In accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M.
3. Bolting: Use lock-washers or locknuts.
4. Wheels: Minimum 5 inch diameter by 1-1/8 inch wide, with non-marring rubber tires; ball, roller, or oil-impregnated metal bearings; minimum of 2 wheels at each floor support.
5. Finish: Manufacturer's standard enamel or powder coating.
6. Row Locking: Automatically mechanically lock each carriage to adjacent carriages when fully extended.
7. Unlocking: Automatically unlock all rows before engaging retraction mechanism.

E. Motor Operation: Manufacturer's standard drive mechanism, using motor adequately sized for the purpose.
1. System as a whole must be UL listed.
2. Provide UL listed electrical components and wiring.
3. Electrical components, devices, and accessories shall be listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application. Coordinate with local building code requirements for telescoping stands.
4. Controls: Start, Stop, Forward, and Reverse in a single control unit.
5. Control Station: Remote wall-mounted key-switched control.

6. Limit Switches: Automatically stop operation when unit has reached fully open or fully closed position.
7. Provide all wiring internal to bleacher units, to junction box located where indicated; ensure that wiring is not energized except during operation.
8. Electrical Characteristics: 120V / 208V, single phase, 60 Hz.
9. Provide access to motor from front side of bleachers; a hinged front skirt or hinged section at least 30 inches wide is acceptable.

2.03 SEAT AND PLATFORM COMPONENTS

A. Seat/Fascia Assembly: Continuous, molded UV-stabilized high-density polyethylene plastic, seat minimum 1 inch thick, textured finish, homogeneous color throughout, color as selected from manufacturer's full selection of standard and custom colors; approximately 18 inch long sections independently removable with tongue-and-groove or rabbeted interlock at end joints.
   1. Shape: Ergonomically contoured, with internal ribs spaced for natural flexibility; rear edge cantilevered to provide toe room of not less than 3 inches; no openings to trap debris.
   2. Provide end caps of same material and finish on each exposed end.
   3. Supports: Internal steel reinforcement of each seat segment bolted to platform nose member; minimum two bolts per segment.
   4. Seat and Row Numbers: Provide recessed pockets and number plates.
   5. Provide factory or dealer designed logo that incorporates school letters or graphical representation of school logo across the front of the bleachers when in the stored position. Owner will select up to three contrasting colors.
   6. Comply with ADA (36 CFR 1191) and MAAB 521 CMR. Accessible (ADA) locations shall be fully recoverable truncations or "flex-rows" and shall be operable without the need for tools.
      a. Provide first row modular recoverable seating units to be utilized by persons in wheelchairs and able-bodied persons.
      b. Each "flex-row" unit shall have an unlock handle. Unlock handle shall lock the bleacher seats into position when fully opened.
      c. Provide black full-surround steel skirting with no more than 3/4 inch floor clearance.
      d. Provide black injection molded end caps for the nose beams.
      e. Provide mechanical positive lock when the "flex-row" system is in the open and used position.
   7. Colors to be selected by Architect from manufacturer’s full range of custom and standard colors

B. Platform, Tread, and Step Structure: Plywood continuously supported on front and rear with side joints tongue-and-grooved.
   1. Plywood: PS 1, 5-ply southern pine or polyethylene-overlaid Douglas fir or southern pine, Grade A-C.
   2. Plywood Thickness: 5/8 inch, minimum.
   3. Basis of Design Decking Over Plywood: Polydeck, color as selected from manufacturer's standard selection.
   4. Front (Nose), Rear, and Intermediate Supports: Steel channel or tube, hot-dipped galvanized.
   5. Provide end caps of same material and finish on each exposed end.
   6. Nosings: Formed steel, minimum, G60/Z275 hot-dipped galvanized.
   7. At aisles provide permanently attached intermediate steps of same construction and finish.
   8. At bottom of aisles provide step in front of first riser, hinged to first platform to fold for storage.

2.04 HANDRAILS AND RAILINGS

A. Provide the following railings:
   1. Intermediate Self-Storing Aisle Handrails: Removable one- or two-post railing segment mounted in center of aisle at every other row beginning at row 2. Handrails shall, at the permanently mounted pedestals, automatically pivot and / or slide from the stowed position the use position and back to the stowed position as the gym seats open and close. Rails having openings to avoid interference with closed decks are not acceptable.
   2. End of Row Guardrails: Self-storing, at open ends of sections beginning at row 2.
   3. Provide removable guardrails at row 2 behind wheelchair spaces.
   4. Height: 42 inches above adjacent platform or tread.
   5. Colored rails, color as selected from manufacturer's standard selection color as selected from manufacturer's standard and custom selection.

B. Design handrails and railings to withstand the following loads:
   1. Concentrated Load on Handrails: 200 pounds minimum in any direction.
   2. Concentrated Load on Guardrails: 200 pounds minimum any direction along top rail.
   3. Live Load on Handrails: 50 pounds per linear foot minimum, applied in any direction.
   4. Live Load on Guardrails:
      a. Horizontal: 50 pounds per linear foot minimum, applied at the guardrail height.
      b. Vertical: 100 pounds per linear foot minimum, applied vertically to top of guardrail.

C. Railing Construction: Round steel or aluminum pipe or tube, with formed elbows at corners and caps at ends of straight runs.
   1. Aluminum: 1.66 inches minimum outside diameter; natural anodized finish.
   2. Steel: 1-1/2 inch minimum outside diameter, with 11 gauge, 0.12 inch minimum wall thickness; textured powder coat epoxy finish.

2.05 ACCESSORIES

A. Fillers and Closures:
   1. Ends of Retracted Units: Plywood panels, finished to match platforms.
   2. Top Row: Provide seat level rear filler panels to close openings between top row seat and wall; finish to match platforms.
   3. End Curtains: 18 ounce vinyl with grommets; color as selected from manufacturer's full range.
   4. Skirt Panel: On first row provide galvanized steel front skirt panel to prevent players and objects from sliding underneath the first row.

B. Motion Monitor: Strobe light and warning horn rated at 85 dB, both of which operate continuously during movement of any section of bleachers; mount strobe light where it is clearly visible to entire bleacher installation.

C. Scorer's Tables: 6 feet wide by 15 inches deep; relocatable to any row of any section without mounting brackets.
   1. Quantity: Two.

D. Fasteners: Provide hardware and fasteners in accordance with manufacturer's recommendations.

E. Anchorage: As indicated on drawings; provide hardware in accordance with manufacturer's recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

A. See Section 01 40 00 - Quality Requirements.

B. Carefully examine installation areas with installer present, for compliance with requirements affecting performance of the work:
   1. Verify that field measurements are consistent with those on the shop drawings.
   2. Verify that electrical rough-ins have been installed and are accessible.
   3. Do not begin installation until substrates have been properly prepared and area has been cleared of obstructions.
   4. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Commencement of work of this section constitutes acceptance of substrates.

3.02 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.

3.03 INSTALLATION

A. Install telescoping bleacher units according to drawings, accepted submittals, manufacturer's instructions, and as follows:
   1. Provide anchors, inserts, and other items required for installation of units and attachment of adjoining construction.
   2. Do not field cut or alter seats, fascia, or structural members without approval.
   3. Provide manufacturer's field representative to inspect completed installation.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements.

B. Remove, repair and reinstall, or restore in place damaged items prior to inspection for Substantial Completion.
   1. Complete touch-up of damaged surfaced finishes.
   2. Replace damaged materials and components with new if repair is not acceptable to Architect.

3.05 ADJUSTING

A. Lubricate, test, and adjust each moving assembly to ensure proper operation in compliance with manufacturer's recommendations.

3.06 CLEANING

A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

B. Clean exposed and semi-exposed assembly surfaces.

C. Touch up finishes on damaged or soiled areas.

3.07 CLOSEOUT ACTIVITIES

A. Demonstration and Training: Provide manufacturer's field representative to demonstrate to and train Owner's operating personnel in proper operation of equipment.
   1. See Section 01 79 00 - Demonstration and Training for additional requirements.
   2. Location: On site using installed equipment.
   3. Time: As agreed between Owner and Construction Manager.

3.08 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before date of Substantial Completion.

END OF SECTION

SECTION 13 28 00
CLIMBING WALLS

PART 1 – GENERAL

1.01 SUMMARY

A. Fabricating, furnishing, delivering, erecting, and installing the following climbing wall work:
   1. Panelized rock climbing wall system and fasteners.
   2. Handholds and handhold fastening system.
   3. Climbing protection/anchors.
   4. Climbing wall fall attenuation system.
   5. Accessories and hardware for a complete installation.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Construction Submittals
   1. Product data including manufacturer’s product information, standard details, details particular to this project, and installation drawings if applicable.
   2. Submit one sample of climbing wall substrate with the applied surface, minimum 12 inches by 12 inches showing substrate, handhold fastener density and connection, and color and finish of panel.
   3. Installer qualifications.
   4. Specimen warranty.

C. Sustainability Submittals
   1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
   2. The Construction Manager shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.

D. Closeout Submittals
   1. See Section 01 78 00 - Closeout Submittals, for submittal procedures.
   2. Extra Materials: Provide three extra hand holds of each size and shape, with applicable connection hardware. Package to prevent damage, clearly labeled with contents.
      a. Submit delivery receipt signed by Owner's representative.
   3. Submit warranty executed in Owner's name.

1.03 QUALITY ASSURANCE

A. Provide climbing wall systems by a single manufacturer.

B. Substitutions of climbing wall systems and equipment shall conform to Division 01 requirements for substitutions.

C. Installers shall have five years experience installing similar climbing wall systems, and be approved by the submitted climbing wall system manufacturer.

1.04 DELIVERY, STORAGE AND HANDLING

A. Protect products during transit, delivery, storage and handling to prevent damage and maintain integrity of components.

B. Products shall be stored in accordance with manufacturer’s recommendations in an area adjacent to the climbing wall installation.

1.05 WARRANTY

A. Provide manufacturer's standard warranty that its products are free from defects in materials and workmanship.

PART 2 – PRODUCTS

2.01 CLIMBING WALL MANUFACTURERS

A. Subject to compliance with these specifications, provide products of one of the following:
   1. Plywood Panel Systems:
      a. Eldorado; Square Climbing Panel: www.eldowalls.com.
      b. Everlast Climbing; River Rock Climbing Wall: www.everlastclimbing.com. (Basis of Design)
      c. Impact; Rectangular Climbing Panel: www.impactclimbing.com.
      d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

2.02 CLIMBING WALL PANELS

A. Panels shall be mounted to a structure designed and constructed for the purpose of supporting the panels.

B. The panelized climbing wall system panels shall be a minimum of 42 inches by 42 inches in dimension and shall be composed of fire retardant treated (FR-S), plugged and sanded plywood panels 3/4 inch in thickness, painted to match the color of the adjacent wall surface.

2.03 CLIMBING WALL HANDHOLDS

A. Climbing wall system shall provide modular climbing handhold attachment locations compatible with 3/8 inch 16-TPI fasteners for surface mount. Handhold fasteners shall be securely anchored to the sub-surface with adhesive.

B. Modular Handhold bolts:
   1. Shall be 3/8 inch, 16-TPI socket head cap screws or flat head cap screws of length suggested by and provided by the manufacturer of the climbing wall and handhold manufacturer.

C. Handhold fasteners (T-nuts or Flange nuts).

D. Glue-on fastener shall be 3/8 inch - 16 tpi, 3 inch wide flange with perforations to increase glue bond.

2.04 CLIMBING PROTECTION / ANCHORS:

A. Protection anchors are not included in this specification. If protection anchors such as top rope anchors or floor anchors are desired, they must be designed and engineered for the facility.

2.05 CLIMBING WALL HANDHOLDS

A. Modular Handhold Manufacturers: Provide handholds from same manufacturer as climbing wall panels, and compatible with climbing wall panel system.
   1. Eldorado - Trango: Classic Home Gym Kit .
   2. Everlast Climbing; Groperz - Route Setting Hand Holds. (Basis of Design)
   3. Impact; Climbing Hand Holds.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Modular Handholds:
   1. Composed of polyurethane to minimize breakage.
   2. Composed of polyurethane.

3. Provide quantity of handholds sufficient to be placed at a minimum of two per square foot of climbing wall surface area.
4. Include handhold bolts of required length.
5. Handhold fasteners (T-nuts or Flange nuts).
6. Climbing wall system shall provide modular climbing handhold attachment locations compatible with 3/8 inch 16-TPI fasteners for surface mount. Handhold fasteners shall be securely anchored to the sub-surface with adhesive.
7. Modular Handhold Bolts:
    a. Shall be 3/8 inch, 16-TPI socket head cap screws or flat head cap screws of length suggested by and provided by the manufacturer of the climbing wall and handholds.

2.06 CLIMBING WALL FALL ATTENUATION SYSTEM (FLOORING)

1. Eldorado Walls or approved equal.
2. Color: As selected by Architect from manufacturer’s full range.

B. Custom Flip-up floor pads measuring 4 feet by 6 feet by a minimum of two inches thick.
1. Manufacturers: Provide climbing wall fall attenuation system by same manufacturer as climbing wall panel system:
    a. Eldorado; Eldo Flip Up Mats.
    b. Everlast Climbing; Mat Locking System. (Basis of Design)
    c. Impact; Apple Athletics - Fold Up Security Mats.
    d. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.
2. Quantity: Sufficient to protect fall zone of entire climbing wall system, extending beyond ends of climbing wall by distances recommended by climbing wall system manufacturer.
3. Material: Climbing wall system manufacturer's recommended foam type.
4. Color: As selected by Architect from manufacturer’s full range.
5. Cover: Vinyl.
6. Attachment System: Manufacturer's recommended velcro or strap and bolt system.
7. Hanging system to close off wall when not in use.
8. No Climbing Symbol: "NO CLIMBING" shall be printed on every other mat, minimum, in contrasting color to mat surface.

PART 3 – EXECUTION

3.01 PRE-INSTALLATION INSPECTION

A. Verify that all surfaces are ready to receive work and are within specified tolerances.
B. Verify that layout of the materials or equipment will not interfere with installed climbing wall.

3.02 INSTALLATION

A. Complete wall shall comply with specified tolerances and shop drawing requirements.

3.03 CLEAN-UP

A. Clean area of debris from installation of climbing wall.
B. Separate waste materials in accordance with the construction waste management plan and place in designated areas.

3.04 INSPECTION

A. The completed climbing wall shall undergo a full complete final inspection by a duly trained supervisor of the manufacturer and shall be certified by the manufacturer that the finished product has been built in accordance with the manufacturer’s approved installation drawings and these contract documents.

B. The completed climbing wall shall undergo a full and complete final inspection by the Owner or Owner's representative at the completion of climbing wall installation.

3.05 TRAINING

A. Climbing wall installer shall provide a minimum of (1) one-hour training session for the facility operations staff, following the climbing wall installation. Training shall be in person or by video, and shall cover the following topics:
   1. Climbing wall maintenance and periodic inspections.
   2. Route-setting methods and management.
   3. Sample handhold installation and removal.
   4. Climbing wall operations management.

3.06 PROTECTION

A. Provide final protection in a manner that ensures the climbing wall will be without damage and deterioration at time of Substantial Dompletion.

END OF SECTION

SECTION 14 00 01
ELEVATORS TRADE BID SUMMARY

PART 1 GENERAL

1.01 FILING OF TRADE BIDS

A. Trade Bids are required for work under this section in accordance with the provisions of the General Laws of the Commonwealth of Massachusetts, Chapter 149A, Sections 1-8, 10, and 11, as most recently amended.

B. Trade Bids shall be submitted to the Awarding Authority as set forth in the Invitation to Bids and the Instructions to Bidders, accompanied by the bid deposit specified therein.

C. Every Trade Bid for work under this section shall be on the form in this Project Manual furnished by the Awarding Authority.

1.02 GENERAL REQUIREMENTS

A. The General and Supplementary Conditions of the Contract, Construction Manager's Scoping Documents, and General Requirements of the Project Manual, including without exception all sections in Divisions 00 and 01, apply to the Elevators Trade Contractor, material suppliers, and all other persons furnishing labor and materials under this section.

B. Examine all project specifications and drawings for requirements which affect work of this section whether or not such work is specifically mentioned in this section.

C. 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.

D. The following definitions apply to the drawings and specifications:

1. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations".
2. Install: The term "install" is used to describe operations at the project site including actual "unloading, unpacking, assembly, erection, piecing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
3. Provide: The term "provide" is used to mean "furnish and install, complete and ready for the intended use".
4. Installer: An "installer" is the elevator subcontractor or an entity engaged by this subcontractor, either as an employee, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

E. When open-flame or spark producing tools such as blow torches, welding equipment, and the like are required in the process of executing the work, the Construction Manager shall be notified not less than 24 hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant dedicated fire watch who is not otherwise employed as installation labor, where work is being performed until it is completed.

1.03 DESCRIPTION

A. The work of this Trade Bid Section shall include all furnishing and installation of complete elevator systems for the project, as shown on the drawings, as described in the specifications, or as reasonably inferred from either, in the judgment of the Architect.

B. The work of this Trade Bid Section may be (but is not exclusively) shown on the drawings by the section number 14 00 01 or the abbreviation "SC-ELEV".

C. The work of this Trade Bid Section shall include the scope of each of the following sections in their entirety:
   1. Section 14 24 00 - Hydraulic Elevators.

D. This Trade Contractor shall fully coordinate the execution of the work of this section with, and anticipate the requirements of the following sections:
   1. Section 03 30 00 - Cast-in-Place Concrete; pit construction and sump location.
   2. Section 04 20 00 - Unit Masonry; door frames and rail anchors to be incorporated into masonry walls; and position of hoisting/safety beam.
   3. Section 05 50 00 - Metal Fabrications; Pit ladder, sump cover, and sill support angles.
   4. Section 06 10 00 - Rough Carpentry: plywood subfloor in elevator cab.
   5. Section 07 14 00 - Fluid-Applied Waterproofing.
   6. Section 07 72 00 - Roof Accessories: hoistway vent assembly.
   7. Section 07 84 00 - Firestopping.
   8. Section 07 92 00 - Joint Sealants.
   9. Section 09 21 16 - Gypsum Board Assemblies: wall surfaces to receive recessed floor lanterns and call button assemblies.
   10. Section 09 91 23 - Interior Painting.
   11. Division 21: Fire Protection sections.
   12. Division 22: Plumbing sections.
   13. Division 23: HVAC sections.
   14. Division 26: Electrical sections.
   15. Division 27: Communications sections.
   16. Division 28: Electronic Safety and Security sections.

E. Sub-Sub Bid Requirements: See Section 00 21 13 - Instructions to Bidders TRADE BIDS Paragraph, and Section 00 41 01 - Form for Trade Contractor Bid for instructions regarding "Paragraph E" Sub-Trade Bids.

F. Primary Drawings listed are those intended to indicate the scope of work for this trade.
   1. List of Primary Drawings: To be provided prior to the release of Bid Set.
   2. This Trade Contractor shall review all remaining drawings that may show additional information relating to specific installation conditions and information that may be required to calculate exact quantities, determine specific installation requirements, or generally coordinate the work with other trades.
   3. Additionally, this Trade Contractor must include in the List of Primary Drawings: To be provided prior to the release of Bid Set, Code Plans, Phasing Plans, Demolition Plans, and all project detail sheets for general and code-related information, installation or other conditions and instructions that directly affect their work.

G. Staging and Scaffolding: The work of this Trade Bid Section shall include the provision of staging and scaffolding (including design, engineering, erection, maintenance, and removal) required to complete the work of this Trade Bid category . All staging or scaffolding provided shall include safety devices and meet all applicable laws and regulations.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

H. Temporary Hoisting Equipment, Lifts, and Machinery: The work of this Trade Bid Section shall include all temporary hoisting equipment, lifts, and machinery required to complete the work of this Trade Bid category. All hoisting equipment, lifts, and machinery and operation shall comply in all respects to the governing laws and codes.
   1. See Section 01 50 00 - Temporary Facilities and Controls for additional information.

I. Cutting and Patching:

1. This Trade Contractor shall perform all cutting and coring required to complete the work of this Trade Bid category, except as specifically indicated in the respective technical Specification sections. Where any of the sections listed as part of this Trade Bid indicate that cutting and coring shall be performed by parties other than the Elevator Trade Contractor, the cost of such cutting and coring necessary for the work of this section shall be borne by the Elevator Trade Contractor.
2. All patching required to complete the work of all sections listed as part of this Trade Bid shall be performed by the appropriate trade, and the cost of such patching necessary for the work of this section shall be borne by this Trade Contractor.
3. All cutting, coring, and patching shall be coordinated through and by the Construction Manager.
4. Any and all cutting of structural members, including floor slabs, shall require approval of the project's Structural Engineer of Record; see Structural Drawings for typical penetrations and openings in structural members, including floor slabs. For any openings outside the parameters of those indicated on Structural Drawings, obtain approval from Structural Engineer of Record.
5. See Section 01 70 00 - Execution and Closeout Requirements for additional information and requirements.

1.04 REFERENCE STANDARDS

A. See each individual technical specification section listed above for Reference Standards.

1.05 SUBMITTALS

A. See each individual technical specification section listed above for required product literature, samples, shop drawings, and other submittals required.

B. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.06 LEED REQUIREMENTS

A. This project is intended to be certified as a LEED for Schools v4/v4.1 building, with a rating of LEED "Silver". See Section 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard for projected LEED credits. Some product and material selections, and some performance requirements of this section are required to achieve the credits listed.

B. Prior to any product submittals, the Elevators Trade Contractor shall assist the Construction Manager in the creation of a LEED action plan identifying products that will contribute toward LEED credits. The LEED Action Plan shall be submitted prior to any product submittals to assist the Architect in evaluating product submittals that must meet LEED criteria.

C. The E Trade Contractor shall provide all documentation indicating applicability of all products of this section to potential LEED credits to the project LEED Administrator for submission to www.leedonline.com. See Section 01 81 13 - Sustainable Design Requirements for additional requirements.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Massachusetts.

B. See each individual technical specification section listed above for quality assurance requirements.

C. See Section 01 40 00 - Quality Requirements for additional requirements.

1.08 WARRANTY

A. See each individual technical specification sections listed above for specific warranty requirements.

B. See Sections 01 70 00 - Execution and Closeout Requirements and 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR PRODUCT REQUIREMENTS.

PART 3 EXECUTION (SEE EACH INDIVIDUAL SPECIFICATION SECTION LISTED ABOVE FOR ADDITIONAL EXECUTION REQUIREMENTS.

3.01 CLEANING

A. Elevators Trade Contractor shall be responsible for cleaning up Elevator Trade Contractor's own work at the end of each day, and depositing waste and debris created by Elevator Trade Contractor's work in the appropriate dumpsters, separating eligible products for recycling, and depositing recycling in designated recycling containers. Dumpsters shall be provided and maintained (including payment of costs for legal disposal off-site) by the Construction Manager.

1. See Section 01 50 00 - Temporary Facilities and Controls.
2. See Section 01 74 19 - Construction Waste Management and Disposal

END OF SECTION

SECTION 14 24 00
HYDRAULIC ELEVATORS

PART 1 GENERAL

1.01 TRADE BID REQUIRED

A. The work of this section shall be included in the Elevators Trade Bid. See Section 14 00 01 - Elevators Trade Bid Summary for additional requirements.

1.02 SECTION INCLUDES

A. Fabricating, furnishing, delivering, erecting and installing the following hydraulic elevators work:
   1. Complete hydraulic elevator systems.
      a. Passenger type.
      b. Elevator car enclosures, hoistway entrances and signal equipment.
      c. Operation and control systems.
      d. Accessibility provisions for physically disabled persons.
      e. Materials and accessories for a complete elevator installation.
      f. Interconnection with building fire alarm systems and security system card access.

B. Elevator Maintenance Contract.

1.03 ABBREVIATIONS AND ACRONYMS

A. CFR. Code of Federal Regulations; www.gpo.gov.
B. ADA. Americans with Disabilities Act; www.ada.gov.
C. AISC. American Institute of Steel Construction; www.aisc.org.
D. ANSI. American National Standards Institute; www.ansi.org.
E. ASCE. American Society of Civil Engineers; www.asce.org.
F. ASME. American Society of Mechanical Engineers; www.asme.org.
G. ASTM. ASTM International; www.astm.org.
H. NEMA. The Association of Electrical Equipment and Medical Imaging Manufacturers; www.nema.org.
I. NFPA. National Fire Protection Association; www.nfpa.org.
J. PS. (APA) The Engineered Wood Association; www.apawood.org.

1.04 REFERENCE STANDARDS

A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced.
B. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
C. ADA Standards - 2010 ADA Standards for Accessible Design.
D. AISC 360 - Specification for Structural Steel Buildings.
E. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
F. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
G. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices.
H. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks Includes Inspection Procedures for Electric Traction and Winding Drum Elevators, Hydraulic Elevators, Inclined Elevators, Limited-Use/Limited-Application Elevators, Private Residence Elevators, Escalators, Moving Walks, Dumbwaiters, and Material Lifts.

I. ASTM A139/A139M - Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over).
J. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
M. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
N. AWS D1.1/D1.1M - Structural Welding Code - Steel.
O. NEMA LD 3 - High-Pressure Decorative Laminates.
P. NEMA MG 00001 - Motors and Generators.
Q. NFPA 70 - National Electrical Code.
R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
S. PS 1 - Structural Plywood.

1.05 REGULATORY REQUIREMENTS

A. Fabrication and installation work in compliance with applicable codes and jurisdictional authorities.
B. File shop drawings and submissions with local authorities as the information is made available. Company pre-inspection and jurisdictional authority inspections and permits are to be made on timely basis so as not to delay installation and Project schedule.
C. Obtain all permits required for the work of this Section.
D. Locate elevator control panels, transformers, and other equipment within elevator machine room to meet requirements of state elevator code.
E. Elevator design, clearances, construction, workmanship, materials, and installation, unless specified otherwise, shall be in accordance with Massachusetts State Building Code / ASME A17.1, MAAB accessibility rules, Americans with Disabilities Act, and other codes having legal jurisdiction.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination per 01 31 14 - Coordination and as follows:
    1. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
    2. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms with Construction Manager, Masonry, Electrical, and concrete subcontractors.
    3. Coordinate required pit depth and modifications with Construction Manager, Concrete subcontractor and Misc. Metals Trade Contractor.
    4. Obtain elevator permit and inspection, paying for all associated costs.
    5. Coordinate the work with Electrical Trade Contractor to provide conduits necessary for installation of wiring including but not limited to:
        a. Elevator equipment devices remote from elevator machine room or hoistway.
        b. Telephone service for machine room and cab.
        c. Elevator pit for lighting and pit for portable pump.
        d. Fire alarm panel from controller cabinet.
        e. Card reader access control system.

f. To dedicated transformer for elevator if located remotely.

6. Coordinate work with other installers for equipment provisions necessary for proper elevator operation, including but not limited to, the following:
   a. Automatic transfer switches with auxiliary contacts for emergency power transfer status indication.
   b. Overcurrent protection devices selected to achieve required selective coordination.

B. Preinstallation Meeting per Section 01 70 00 - Execution and Closeout Requirements:
   1. Review schedule of installation, proper procedures and conditions, and coordination with related work.

C. Construction Use of Elevator: Not permitted.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Construction Submittals
   1. Product Data: Submit data on following items:
      a. Signal and operating fixtures, operating panels, and indicators.
      b. Car design, dimensions, layout, and components.
      c. Car and hoistway door and frame details.
      d. Electrical characteristics and connection requirements.
   2. Shop Drawings: Include appropriate plans, elevations, sections, diagrams, and details on following items:
      a. Locations of Elevator Machine Equipment: Driving machines, power units, controllers, and other component. Provide for clear passage of equipment through access door.
      b. Hoistway Components: Car guide rails, buffers, jack unit and other components. Include locations and sizes of sump, pit ladder, and structural components provided by other trades and required for a complete installation.
      c. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
      d. Air movement openings between hoistway and machine room.
      e. Path of hydraulic piping between equipment in pit and machine room.
      f. Individual weight of principal components; load reaction at points of support.
      g. Clearances and over-travel of car.
      h. Locations in hoistway and machine room of traveling cables and connections for car lighting and telephone.
      i. Location and sizes of hoistway and car doors and frames. Details shall be created specifically for this project and reflect project's wall construction and relationship to frames
      j. Applicable seismic design data.
      k. Interface with building security system.
      l. Electrical characteristics and connection requirements.
   3. Samples: Submit samples illustrating car interior finishes, 12 by 12 inches.
   4. Testing Agency's Qualification Statement.
   5. Certifications of required fire resistance ratings.
   6. Certifications of required listings and classifications for products requiring electrical connection.
   7. Specimen warranty.

C. Sustainability Submittals

1. The proposed project is intended to be certified as a LEED "Silver" building per the LEED for Schools v4/v4.1 rating system. Sections 01 81 14 - LEED for Schools v4/v4.1 Project Scorecard and 01 81 13 - Sustainable Design Requirements apply to this Section. Additional prerequisite and credit compliance requirement information is available from the USGBC LEED for Schools v4/v4.1 credit library.
2. The Elevators Trade Contractor shall provide all documentation indicating applicability of products of this Section to potential LEED credits to the Project LEED Administrator using the 01 81 15 - LEED v4 Product Data - Sustainable Attributes Reporting Form.
    a. See applicable Division 09 section for sustainability requirements of elevator flooring.

D. Closeout Submittals
1. Submit in accordance with Section 01 78 00 - Closeout Submittals.
2. Initial Maintenance Contract:
    a. Executed contract for routine maintenance during 12-month warranty period.
3. Maintenance Contract:
    a. Submit proposal to Owner for standard one year continuing maintenance contract agreement in accordance with ASME A17.1 and requirements as indicated, starting on date initial maintenance contract is scheduled to expire. Identify cost of maintenance contract.
        1) Indicate in proposal the services, obligations, conditions, and terms for agreement period and for renewal options.
4. Demonstration and Training: submit log of training, with names and signatures of attendees recorded, and indicating date of training and duration. Submit video recording of training session, in electronic format on DVD or portable USB storage drive.
5. Operation and Maintenance Data:
    a. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
    b. Operation and maintenance manual.
    c. Schematic drawings of equipment and hydraulic piping, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.
6. Warranty Documentation: Submit manufacturer executed one year warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: Perform installation with skilled, experienced and trained workmen supervised by trained personnel who shall have at least ten years successful experience in installations of similar size and scope.
B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.
C. Products Requiring Fire Resistance Rating: Listed and classified by testing agency acceptable to authorities having jurisdiction.
D. Products Requiring Electrical Connection: Listed and classified by testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.
E. Documents at Project Site: Maintain at project site one copy of manufacturer's instructions, erection drawings, and shop drawings.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s instructions and recommendations, Section 01 25 00 - Substitution Procedures, and as follows:

1. Store materials, components and equipment in manufacturer’s original protective packaging in a dry protected area.
2. Handle materials in accordance with manufacturer’s recommendations to prevent damage, soiling, or deterioration.

1.10 WARRANTY

A. Special Manufacturer's Warranty: Prepare and submit in accordance with Section 01 78 00 - Closeout Submittals.

B. Manufacturer Warranty: Provide standard manufacturer warranty for elevator operating equipment and devices. Complete forms in Owner's name and register with manufacturer.

C. Elevator Trade Contractor responsible for the installation of the elevator shall be responsible for repairing, restoring, or replacing defective elevator work for elevator operating equipment and devices during the 12 month manufacturer warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hydraulic Elevator Manufacturers: Subject to compliance with these specifications, provide products of one of the following:
   1. Canton Elevator, Incorporated: www.cantonelevator.com.
   2. Schindler Elevator Corporation: www.schindler.com.
   3. TK Elevator; Endura Above-Ground: www.tkelevator.com.
   4. Or equal. Substitutions: Other manufacturers' products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and appearance. Submit as substitutions: See Section 01 25 00.

B. Source Limitations: Provide elevator and associated equipment and components produced by a single manufacturer and obtained from a single supplier.

2.02 HYDRAULIC ELEVATORS

A. Hydraulic Elevator:
   1. Hydraulic Elevator Equipment:
      a. Holeless hydraulic with cylinder mounted within hoistway.
         1) Two- or three-stage telescoping piston configuration per requirements of manufacturer to fit hoistway dimensions indicated.
   2. Drive System:
      a. Variable voltage variable frequency (VVVF) to modulate motor speed.
   3. Operation Control Type:
      a. Single Automatic (Push Button).
   4. Service Control Type:
      a. Standard service control only.
   5. Interior Car Height: Manufacturer's standard; to provide not less than 88 inch interior ceiling height.
   6. Electrical Power: 480 volts; alternating current (AC); three phase; 60 Hz.
      a. Manufacturer shall provide all required transformers, for installation by Electrical Trade Contractor.
   7. Horsepower rating required by manufacturer for elevator capacity and speed: [30] hp Maximum
   8. Rated Net Capacity: 4000 pounds.
   9. Rated Speed: 100 feet per minute.
   10. Hoistway Size: As indicated on drawings.
   11. Interior Car Platform Size: As indicated on drawings.

12. Elevator Pit Depth: As indicated on Drawings; coordinate any required deviations with Construction Manager and concrete subcontractor.
13. Overhead Clearance at Top Floor: As indicated on Drawings; coordinate any required deviations with Construction Manager and steel subcontractor.
14. Travel Distance: As indicated on drawings.
15. Number of Stops: As indicated on drawings.
16. Number of Openings: Two Front.
17. Hydraulic Equipment Location: As indicated on drawings.
18. Hydraulic Motor and Pump Location: Adjacent to hoistway at lowest floor.

2.03 COMPONENTS

A. Elevator Equipment:
   1. Guide Rails, Cables, Buffers, Attachment Brackets and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code, ASME A17.1.
   2. Buffers:
      a. Spring type for elevators with speed less than or equal to 200 fpm.
   3. Lubrication Equipment:
      a. Provide grease fittings for periodic lubrication of bearings.
      b. Lubrication Points: Visible and easily accessible.

B. Electrical Equipment:
   1. Motors: NEMA MG 1.
   2. Boxes, Conduit, Wiring, and Devices: As required by NFPA 70.

2.04 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).
B. Accessibility Requirements: Comply with ADA Standards.
C. Perform structural steel design, fabrication, and installation in accordance with AISC 360.
D. Comply with seismic design requirements in accordance with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).
   1. Complying with Elevator Safety Requirements for Seismic Risk Zone in accordance with ASME A17.1, ASCE 7 and other related requirements.
      a. Project Seismic Risk: As indicated on Structural drawings.
   2. Provide earthquake emergency operations in accordance with ASME A17.1 requirements.
E. Perform welding of steel in accordance with AWS D1.1/D1.1M.
F. Fabricate and install door and frame assemblies in accordance with NFPA 80 and in compliance with requirements of authorities having jurisdiction.
G. Perform electrical work in accordance with NFPA 70.
H. Comply with venting or pressurization of hoistway design in accordance with HVAC system requirements and authorities having jurisdiction (AHJ).

2.05 OPERATION CONTROLS

A. Elevator Controls: Provide landing operating panels and landing indicator panels.
   1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.
   2. Landing Indicator Panels: Illuminating.
   3. Interconnect elevator control system with building fire alarm and card access systems.
      a. Provide required factory controller components.

B. Door Operation Controls:
   1. Program door control to open doors automatically when car arrives at floor landing.
   2. If doors are prevented from closing for approximately 10 seconds because of an obstruction, automatically disconnect door reopening devices, close doors more slowly until obstruction is cleared. Sound buzzer.
   3. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.
   4. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with photo-electric light rays.
C. Provide "Firefighter's Emergency Operation" in accordance with applicable building codes and authorities having jurisdiction (AHJ).
   1. Designated Landing: At First floor.

2.06 OPERATION CONTROL TYPE

A. Single Automatic (Push Button) Operation Control: Applies to car in single elevator shaft.
   1. Refer to description provided in ASME A17.1.
   2. Set system operation so that momentary pressure of landing button dispatches car from other landing to that landing.
   3. Allow call registered by momentary pressure of landing button at any time to remain registered until car stops in response to that landing call.
   4. If elevator car door is not opened within predetermined period of time after car has stopped at terminal landing allow car to respond to call registered from other landing.

2.07 EMERGENCY POWER

A. Set-up elevator operation to run with building emergency power supply when the normal building power supply fails.
B. Building Emergency Power Supply: Supplied by backup generator; provide elevator system components as required for emergency power characteristics with phase rotation the same as for normal power.
   1. Provide transfer switches and auxiliary contacts.
   2. Install connections to power feeders.
C. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.
D. Provide operational control circuitry for adapting the change from normal to emergency power. Electrical Trade Contractor to connect to emergency generator.
E. Upon transfer to emergency power, advance one elevator at a time to a pre-selected landing, stop car, open doors, disable operating circuits, and hold in standby condition.
F. Provide manual switch to override the automatic selection process.

2.08 MATERIALS

A. Steel Cylinder Casing: ASTM A139/A139M, Grade A steel.
B. Stainless Steel Sheet: ASTM A666/A666M, Type 304; No. 4 Brushed finish unless otherwise indicated.
C. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.
D. Plywood: PS 1, Structural I, Grade C-D or better, sanded.
E. Tempered Glass: 3/8 inch minimum thickness, fully tempered in compliance with ASME A17.1, 16 CFR 1201, ANSI Z97.1, and ASTM C1048 tempered glass requirements.
F. Plastic Laminate: NEMA LD 3, Type HGS, color as selected by Architect from manufacturer's standard line of colors.

2.09 CAR AND HOISTWAY ENTRANCES

A. Car and Hoistway Entrances:
   1. Hoistway Fire Rating: As indicated on drawings.
   2. Elevator Door Fire Rating: To meet code requirements for hoistway rating indicated on drawings.
   3. Framed Opening Finish and Material: Brushed stainless steel.
   4. Car Door Material: To match hoistway entrance doors, with rigid sandwich panel construction.
   5. Hoistway Door Material: Brushed Stainless steel, 16 gage, with rigid sandwich panel construction.
   6. Door Type: Single leaf.
   7. Door Position: Provide front and rear openings staggered at opposite sides of hoistway if required to permit stretcher passage through the elevator.
   8. Door Operation: Side opening, single speed.
   9. Door Width: As indicated on drawings.
   10. Door Height: As indicated on drawings.
   11. Sills: Extruded aluminum.

2.10 CAR EQUIPMENT AND MATERIALS

A. Car Operating Panel: Provide main; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served with "Door Open/Door Close" buttons and alarm button.
   1. Panel Material: Integral with front return; one per car.
   2. Car Floor Position Indicator: Above car operating panel with illuminating position indicators.
   3. Locate alarm button where it is unlikely to be accidentally actuated; not more than 48 inch above car finished floor.
   4. Provide matching service cabinet integral with front return panel, with hinged door and keyed lock in each car.
   5. Provide following within service cabinet as part of car operating panel:
      a. Switch for each auxiliary operational control.
      b. Switches for inspection control.
      c. Emergency light.
      d. Telephone cabinet and hard-wired connection with telephone.
      e. Control for each other special feature specified.
      f. Two-way message display for hearing- and speech-impaired users.
   6. Provide convenience outlet receptacle; 110VAC, 15 amps, locate below service cabinet.
   7. Ventilation: Single speed fan with manufacturer's standard configuration for ventilation.
   8. Flooring: Resilient sheet flooring, as indicated on drawings. To be furnished and installed by Division 09 Resilient Flooring Trade Contractor, and as specified in Section 09 65 00 - Resilient Flooring and floor finish plans.
   9. Wall Base: Brushed stainless steel, 4 inch high.
   10. Wall Finish: Plastic laminate on plywood. As indicated on Drawings, or if not indicated, to be selected by Architect from manufacturer's full range of patterns and colors.
   11. Hand Rail: Stainless steel, at rear wall. Provide open clearance space 1-1/2 inch (38 mm) wide to face of wall.
      a. Round, Metal Tube: 1-1/2 inch diameter.
      b. Stainless Steel Finish: No. 4 Brushed.

12. Ceiling: Brushed stainless steel pan panels with minimum of six concealed or recessed light fixtures with circular apertures or lenses .
    a. Lighting: Down-lit LED compact lights with elevator manufacturer's polycarbonate sheet diffusing covers.

B. Car Accessories:
1. Certificate Frame: Same as certificate frame and glazing type in MACHINE ROOM FITTINGS paragraph below, and attached with tamper-proof screws.
2. Protective Pads: Canvas cover, padded with impact-resistant fill material, sewn with piping edges; fire resistant in compliance with ASME A17.1; brass grommets for supports, covering side and rear walls and front return, with cut-out for control panel; provide one set for each elevator.
    a. Color: Tan.
    b. Provide at least 4 inch clearance from bottom of pad to finished floor.
    c. Pad Supports: Stainless steel studs, and mounted at 80 inches above the floor.

2.11 MACHINE ROOM FITTINGS

A. Wall-Mounted Frames: Glazed with clear plastic; sized to fit charts, but not less than 8-1/2 by 11 inches. Charts shall be readily legible without magnification. Provide one chart each for master schematic and for lubrication chart. Install charts.

B. Key Cabinet: Wall-mounted, lockable, keyed to building keying system, for control and operating panel keys.
1. Provide two key cabinet keys.
2. Provide two control/operating panel keys.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
1. Carefully examine installation areas with Installer/Applicator present, for compliance with requirements affecting work performance.
2. Verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are within acceptable tolerances required by the manufacturer, and ready to receive work.
3. Verify existing conditions before starting this work.
4. Verify that hoistway, pit, and machine room are ready for work of this section.
5. Verify hoistway shaft and openings are of correct size and within tolerance.
6. Verify location and size of machine foundation and position of machine foundation bolts.
7. Verify that electrical power is available and of correct characteristics.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components; see Section 01 50 00 - Temporary Facilities and Controls for additional requirements.

B. Maintain elevator pit excavation free of water.

3.03 INSTALLATION

A. Install Elevator Systems according to Drawings, submittals, manufacturer's instructions applicable state codes, and as follows:
1. Coordinate this work with installation of hoistway wall construction.
2. Install system components, and connect equipment to building utilities.

a. Provide conduit, electrical boxes, wiring, and accessories for wiring provided by this Section.

3. Install hydraulic piping between cylinder and pump unit.
4. Mount motors and pumps on vibration and acoustic isolators and in accordance with manufacturer's instructions.
   a. Securely fasten to building supports.
   b. Prevent lateral displacement.
5. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.
6. Install guide rails to allow for thermal expansion and contraction movement of guide rails.
7. Accurately machine and align guide rails, forming smooth joints with machined splice plates.
8. Bolt brackets to supports embedded in CMU.
9. Coordinate forming of concrete at elevator pit and sump with Section 03 30 00 - Cast-in-Place Concrete subcontractor.
10. Install hoistway door sills and frames in hoistway walls. Set entrances in vertical alignment with car openings, and align plumb with hoistway lines.
11. Coordinate installation of hoistway wall construction with Section 04 20 00.
12. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.
13. Machine Room Components: Clean and degrease; prime one coat, finish with one coat of enamel.
14. Wood Surfaces not Exposed to Public View: Finish with one coat primer; one coat enamel.
15. Adjust equipment for smooth and quiet operation.
16. If required by project sequencing, provide up to 16 hours of labor for elevator operator to take elevator out of service to allow for other construction operations in hoistway after elevator installation is complete.

3.04 TOLERANCES

A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.

B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.05 FIELD QUALITY CONTROL

A. Testing and inspection performed at discretion of regulatory agencies certified in accordance with ASME QEI 1.
   1. Schedule tests with agencies and notify Owner and Architect.
   2. Obtain permits as required to perform tests.
   3. Document regulatory agency tests and inspections in accordance with requirements of Section 01 40 00 - Quality Requirements.
   4. Perform tests required by regulatory agencies.
   5. Furnish test and approval certificates issued by authorities having jurisdiction.

3.06 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.

B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch maximum from flush with sill.

C. Adjust doors for smooth, consistent operation.

3.07 CLEANING

A. Remove protective coverings from finished surfaces.

B. Clean surfaces and components in accordance with manufacturers written instructions.
C. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.

3.08 CLOSEOUT ACTIVITIES

A. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
B. See Section 01 79 00 - Demonstration and Training for additional requirements.
C. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, cleaning and maintenance of each component.
D. Training: Train Owner's personnel on cleaning and operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials. Instruct Owner's personnel in proper use, operations, cleaning, and daily maintenance of each component of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's designated personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
   2. Make a final check of each elevator operation with Owner's designated personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.
   3. Provide minimum of two hours of training.
   4. Instructor: Manufacturer's training personnel.
   5. Location: At project site, unless noted otherwise.

3.09 PROTECTION

A. Do not permit construction traffic within car after cleaning.
B. Protect installed products until Date of Substantial Completion.
C. Touch-up, repair, or replace damaged products and materials prior to Date of Substantial Completion.

3.10 MAINTENANCE

A. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for 3 months from Date of Substantial Completion.
B. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or original installer.
C. Maintenance contract services shall not be assigned or transferred to any agent or other entity without prior written consent of Owner.
D. Examine system components at intervals required by code and by manufacturer's warranty and service terms.
E. Include systematic examination, adjustment, and lubrication of elevator equipment, per manufacturer's recommendations and in compliance with local ordinances.
F. Perform work without removing cars from use during peak traffic periods.
G. Provide emergency call back service during regular working hours throughout period of this maintenance contract.
H. Maintain an adequate stock of parts for replacement or emergency purposes, and have personnel available locally, near the place of the work, to ensure the fulfillment of this maintenance contract without unreasonable loss of time.

END OF SECTION