# TECHNICAL SPECIFICATIONS

## VOLUME 1

### DIVISION 1 - GENERAL REQUIREMENTS

- **011000** Summary
- **012100** Allowances
- **012500** Substitution Procedures
- **012501** Substitution Request Form – Before Receipt of Bids
- **012502** Substitution Request Form – After Receipt of Bids
- **012600** Contract Modification Procedures
- **012601** Project Modification Form
- **012900** Payment Procedures
- **013100** Project Management and Coordination
- **013200** Construction Progress Documentation
- **013300** Submittal Procedures
- **014000** Quality Requirements
- **014200** References
- **015000** Temporary Facilities and Controls
- **016000** Product Requirements
- **017300** Execution
- **017419** Construction Waste Management
- **017700** Closeout Procedures
- **017839** Project Record Documents
- **017900** Demonstration and Training
- **018119** Indoor Air Quality Requirements

### DIVISION 2 - EXISTING CONDITIONS

- **024119** Selective Structure Demolition

### DIVISION 3 – CONCRETE

- **033000** Cast-In-Place Concrete

### DIVISION 4 - MASONRY

- **042000** Unit Masonry

### DIVISION 5 – METALS

- **055000** Metal Fabrications
<table>
<thead>
<tr>
<th>DIVISION 6 - WOOD PLASTICS AND COMPOSITES – NOT USED</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIVISION 7 - THERMAL AND MOISTURE PROTECTION</td>
</tr>
<tr>
<td>075423 Thermoplastic Polyolefin (TPO) Roofing</td>
</tr>
<tr>
<td>076201 Flashing, Sheet Metal and Roofing Accessories</td>
</tr>
<tr>
<td>079200 Joint Sealants</td>
</tr>
<tr>
<td>DIVISION 8 - OPENINGS</td>
</tr>
<tr>
<td>081113 Steel Doors and Frames</td>
</tr>
<tr>
<td>081416 Flush Wood Doors</td>
</tr>
<tr>
<td>084113 Aluminum Framed Entrances and Storefront</td>
</tr>
<tr>
<td>087100 Door Hardware</td>
</tr>
<tr>
<td>DIVISION 9 - FINISHES</td>
</tr>
<tr>
<td>092216 Cold-Formed Steel Framing – Non-Structural (CFSF-NS)</td>
</tr>
<tr>
<td>092900 Gypsum Board</td>
</tr>
<tr>
<td>093000 Tiling</td>
</tr>
<tr>
<td>095113 Acoustical Panel Ceilings</td>
</tr>
<tr>
<td>096513 Resilient Base and Accessories</td>
</tr>
<tr>
<td>096519 Resilient Tile Flooring</td>
</tr>
<tr>
<td>096566.16 Vinyl Athletic Flooring</td>
</tr>
<tr>
<td>096813 Tile Carpeting</td>
</tr>
<tr>
<td>099100 Painting</td>
</tr>
<tr>
<td>DIVISION 10 - SPECIALTIES</td>
</tr>
<tr>
<td>101100 Visual Display Surfaces</td>
</tr>
<tr>
<td>101400 Signage</td>
</tr>
<tr>
<td>102123 Cubicle Curtains and Track</td>
</tr>
<tr>
<td>104416 Fire Extinguishers</td>
</tr>
<tr>
<td>DIVISION 11 - EQUIPMENT</td>
</tr>
<tr>
<td>116143 Stage Curtains</td>
</tr>
<tr>
<td>116623 Gymnasium Equipment</td>
</tr>
<tr>
<td>DIVISION 12 - FURNISHINGS</td>
</tr>
<tr>
<td>122113 Horizontal Louver Blinds</td>
</tr>
<tr>
<td>123216 Manufactured Plastic-Laminate-Faced Casework</td>
</tr>
<tr>
<td>DIVISION 13 - SPECIAL CONSTRUCTION</td>
</tr>
<tr>
<td>132800 Hazardous and Universal Waste Management</td>
</tr>
<tr>
<td>132801 Removal of Asbestos-Containing Materials</td>
</tr>
<tr>
<td>132802 Lead Control Procedures</td>
</tr>
</tbody>
</table>
### DIVISION 14 - CONVEYING SYSTEMS – NOT USED

### VOLUME 2

#### DIVISION 21 - FIRE SUPPRESSION

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>210500</td>
<td>Common Work Results for Fire-Suppression</td>
</tr>
<tr>
<td>210533</td>
<td>Heat Tracing for Fire Suppression Piping</td>
</tr>
<tr>
<td>211000</td>
<td>Water-Based Fire-Suppression Systems</td>
</tr>
</tbody>
</table>

#### DIVISION 22 - PLUMBING

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>220500</td>
<td>Common Work Results for Plumbing</td>
</tr>
<tr>
<td>220513</td>
<td>Motors for Plumbing Equipment</td>
</tr>
<tr>
<td>220517</td>
<td>Sleeves and Sleeve Seals for Plumbing Piping</td>
</tr>
<tr>
<td>220519</td>
<td>Meters and Gages for Plumbing Piping</td>
</tr>
<tr>
<td>220523</td>
<td>General-Duty Valves for Plumbing Piping</td>
</tr>
<tr>
<td>220529</td>
<td>Hangers and Supports for Plumbing Piping and Equipment</td>
</tr>
<tr>
<td>220553</td>
<td>Identification for Plumbing Piping and Equipment</td>
</tr>
<tr>
<td>220700</td>
<td>Plumbing Insulation</td>
</tr>
<tr>
<td>221113</td>
<td>Facility Natural Gas Piping</td>
</tr>
<tr>
<td>221116</td>
<td>Domestic Water Piping</td>
</tr>
<tr>
<td>221119</td>
<td>Domestic Water Piping Specialties</td>
</tr>
<tr>
<td>221125</td>
<td>Circulating Pumps</td>
</tr>
<tr>
<td>223400</td>
<td>Fuel Fired, Domestic-Water Heaters</td>
</tr>
</tbody>
</table>

#### DIVISION 23 - MECHANICAL

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>230500</td>
<td>Common Work Results for HVAC</td>
</tr>
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#### DIVISION 26 - ELECTRICAL

<table>
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<tbody>
<tr>
<td>260519</td>
<td>Low-Voltage Electrical Power Conductors and Cables</td>
</tr>
<tr>
<td>260529</td>
<td>Hangers and Supports for Electrical Systems</td>
</tr>
<tr>
<td>260533</td>
<td>Raceway and Boxes for Electrical Systems</td>
</tr>
<tr>
<td>260923</td>
<td>Lighting Control Devices</td>
</tr>
<tr>
<td>265119</td>
<td>LED Interior Lighting</td>
</tr>
</tbody>
</table>

#### DIVISION 27 – COMMUNICATIONS – NOT USED

#### DIVISIONS 28 - ELECTRONIC SAFETY AND SECURITY

<table>
<thead>
<tr>
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<tr>
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<td>Intrusion Detection System</td>
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<tr>
<td>282300</td>
<td>Video Surveillance</td>
</tr>
<tr>
<td>283111</td>
<td>Digital, Addressable Fire-Alarm System</td>
</tr>
</tbody>
</table>
DIVISION 31 – EARTHWORK – NOT USED
DIVISION 32 – EXTERIOR IMPROVEMENTS – NOT USED
DIVISION 33 – UTILITIES – NOT USED
DIVISION 34 – TRANSPORTATION – NOT USED

END OF TABLE OF CONTENTS
SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PROJECT INFORMATION
      1. Project Location: 4653 Taney Avenue, Alexandria, VA 22304.
   B. Owner: Alexandria City Public Schools.
   C. Architect: Moseley Architects of Fairfax, Virginia.

1.3 WORK COVERED BY CONTRACT DOCUMENTS
   A. The Work of Project is defined by the Contract Documents and consists of the following:
      The original Patrick Henry School previously slated for demolition following the completion
      of the new Patrick Henry building, will be renovated and used as a swing space for the Doug-
      las MacArthur school. This building will be occupied for 30 months, while their new building
      is constructed. This will require a DSUP amendment that includes the suspension of original
      Phase 3 for the Patrick Henry project, design and permitting of a revised Phase 3a (or Phase – INT)
      and renovation of the existing Patrick Henry School which was to be demolished. The
      building repairs described below will be completed under the 2015 Virginia Existing Build-
      ing Code.
      Scope includes but not limited to the following:
      • Convert existing auditorium into a gymnasium for PE. Work will be limited to infill of
        floor with any necessary wall and ceiling alterations in this space to accommodate the
        proposed functions of the space. PE equipment to be provided. Accessibility through the
        space and adjacent hallway will be evaluated and updated to provide accessible egress
        from the new PE space to the parking lot.
      • Evaluate and update accessibility at main entrance to the building.
      • Replace water damaged finishes and equipment throughout the building.
      • Replace/repair damaged equipment.
      • Coordination with ACPS Food Services to accommodate the equipment pieces which
        were salvaged and relocated to the New Patrick Henry Kitchen.
      • Paint all walls in the building.
      • Replace the fire alarm system to meet current code.
      • Re-lamp all building lights. Clean or replace light lenses assume 15%.
      • Provide site lighting for new parking area and existing parking areas.
      • Design of CCTV, emergency management alarm upgrades and electronic door locks in
        alignment with the anticipated fire alarm upgrades.
      • Provide sprinkler only in change of use for space of existing auditorium converted to
        gymnasium.
      • Provide supplemental tankless water heaters at each toilet room and kitchen.
      • Option to provide an alternate water heating solution (i.e. replacement of the original
        failed water heater for the entire building).
B. Type of Contract:
   1. Project will be constructed under a single prime contract.
   2. Additional work undertaken at the direction of parties not representing the Owner, will be considered as unauthorized work and will not be paid for by the Owner. Additional work must be authorized in writing by the Owner or the Owner’s authorized representative.

C. Use of Professional Seals on Bidding, Procurement, and Contract Documents: for the purposes of this paragraph, the term “Regulant” refers to the individual who signs and seals parts of the Contract Documents (e.g. the Drawings and Specifications). Certain information has been excerpted verbatim from a source or sources (e.g., UL Assemblies, SMACNA details, IBC code text) which was considered or used by Regulant in preparing parts of the Contract Documents, as follows:
   1. The excerpted information was neither prepared under the direct control nor personal supervision nor created by the Regulant, as it was prepared by the source and owner of the excerpted information.
   2. For purposes of bidding, procuring, and performance of the Work, and in any event of conflicts or ambiguities between the excerpted information in the Contract Documents and the requirements of applicable codes and standards, provide the better quality or greater quantity of Work which, at a minimum, complies with the requirements of the applicable codes and standards.
   3. Advise Architect immediately upon becoming aware of requirements of the Work which are not consistent with the requirements of the excerpted information.
   4. Attribution is acknowledged for information obtained and included herein verbatim from other source or sources.
   5. Regulant has taken into consideration and used certain excerpted information from other sources which are applicable to the Contract Documents, and the Regulant indicates by its seal that it is assuming responsibility for its services in use and application of the excerpted information to the requirements of Work, but not for the excerpted information itself which was prepared by others. Regulant does not indicate by its seal that it is responsible for use or application of other information in such source or sources which was not included herein.

1.5 WORK UNDER SEPARATE CONTRACTS
A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.6 ACCESS TO SITE
A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
B. All contractors shall provide a telephone number and alternate number that will be active twenty-four (24) hours a day, seven (7) days a week until after acceptance of Final Completion by ACPS and RCPA for use in emergency situations.
C. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
D. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet beyond building perimeter; 10 feet beyond surface walkways, patios, surface parking, and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.
   2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

E. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
   2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
   3. Special attention shall be paid during periods of standardized testing. Such testing is conducted over a one-week period twice per year.
   4. Contractors shall provide their own dumpsters for collection of construction waste and debris. Contractors shall not dispose any trash or construction debris in the building dumpster.
   5. Contractors and their crews shall not use the school restrooms. Contractors shall provide portable toilets for the use of its crew at its own cost.
   6. Protect occupants from materials producing dust (e.g., silica) and other by-products as regulated by OSHA, federal, state, and local regulations.

B. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, loading docks, or other occupied
or used facilities without written permission from Owner and authorities having jurisdiction.

2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

3. Special attention shall be paid during periods of standardized testing. Such testing is conducted over a one-week period twice per year.

4. Contractors shall provide their own dumpsters for collection of construction waste and debris. Contractors shall not dispose any trash or construction debris in the building dumpster.

5. Contractors and their crews shall not use the school restrooms. Contractors shall provide portable toilets for the use of its crew at its own cost.

6. Protect occupants from materials producing dust (e.g., silica) and other by-products as regulated by OSHA, federal, state, and local regulations.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Shall comply with City of Alexandria regulations.

1. Any work required outside of normal working hours must be permitted by the City of Alexandria and approved by the Owner.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Architect and Owner not less than five days in advance of proposed utility interruptions.

2. Construction Manager shall provide written notice and explain why such a shutdown is necessary and how long it will last. Construction Manager shall also provide alternative solutions for functions, appliance, and equipment that will be impacted by the shutdown.

3. Obtain Architect's and Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.

2. Obtain Architect's and Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

F. Controlled Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.

G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
H. Employee Screening: Comply with Owner's requirements for drug and background screening of
Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000
SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements governing allowances.
      1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
   B. Types of allowances include the following:
      1. Lump-sum allowances.

1.3 SELECTION AND PURCHASE
   A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
   B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
   C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS
   A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
   B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
   C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
   D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION
   A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP-SUM ALLOWANCES
   A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION
   A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES
   A. Allowance No. 1: Lump-Sum Allowance: Include the sum of $14,000.00 for interior and exterior panel signage as specified in Division 10 Section 101400 “Signage.”
      1. This allowance includes material cost, receiving, handling, and installation, and Contractor overhead and profit.
SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 SUBMITTALS
A. Substitution Requests: Contractor shall request and submit a “Substitution Request Form – After Receipt of Bids” for all substitutions to be considered after receipt of bids.
   1. Substitution Request Form: Use the Architect’s form, which can be obtained from the Architect at the time of the request.
      a. The form is an electronic Word document requiring the Contractor to fill in “data fields.”
      b. A copy of the form is attached to the end of this Section for informational purposes only. Use the electronic Word document only.
   2. No substitutions will be considered unless submitted using the referenced “Substitution Request Form – After Receipt of Bids.”
   3. All substitutions must be submitted by the Contractor, and shall include the Contractor’s certification and signature.
      a. Substitution requests submitted directly from subcontractors, sub-subcontractors, manufacturers, vendors, installer, and suppliers will be rejected.
   4. Failure to submit the form, or a fully completed form, shall result in the rejection of the proposed substitution; and shall also include:
      a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will be necessary to accommodate proposed substitution.
      b. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      d. Samples, where applicable or requested.
e. Certificates and qualification data, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Research reports evidencing compliance with building code in effect for Project.
i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

5. If the proposed substitution is found to be acceptable to the Architect, the request will be forwarded to the Owner for their approval.

6. If the Owner approves the substitution, it will then be included in a Change Order or Construction Change Directive.

7. Only substitutions included in Change Orders or Construction Change Directives shall be allowed to be included in the Work.

8. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed.
   a. Forms of Acceptance: Change Order or Construction Change Directive only.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.
PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 21 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when all of the following conditions are satisfied. If all of the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Substitution request is fully documented and properly submitted.
   c. Requested substitution will not adversely affect Contractor's construction schedule.
   d. Requested substitution has received necessary approvals of authorities having jurisdiction.
   e. Requested substitution is compatible with other portions of the Work.
   f. Requested substitution has been coordinated with other portions of the Work.
   g. Requested substitution provides specified warranty.
   h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after Award of Construction Contract. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when all of the following conditions are satisfied. If all of the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume.
      1) Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   b. Requested substitution does not require extensive revisions to the Contract Documents.
   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   d. Substitution request is fully documented and properly submitted.
   e. Requested substitution will not adversely affect Contractor's construction schedule.
   f. Requested substitution has received necessary approvals of authorities having jurisdiction.
   g. Requested substitution is compatible with other portions of the Work.
   h. Requested substitution has been coordinated with other portions of the Work.
   i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500
# Substitution Request Form – Prior to Receipt of Bids

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</table>

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Specification Title</td>
</tr>
<tr>
<td>Section</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Article / Paragraph</td>
</tr>
<tr>
<td>Description</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Proposed Substitution</td>
</tr>
<tr>
<td>Reason for not providing specified product/item</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
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<td>Attach a point-by-point comparative data list. Include all differences between the proposed substitution and the specified product/item. If not provided, this Request will be rejected.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Manufacturer</th>
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<tbody>
<tr>
<td>Manufacturer Address</td>
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<tr>
<td>Manufacturer Phone</td>
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<tr>
<td>Manufacturer Representative Email address</td>
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<table>
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<tr>
<th>Trade / Model Name</th>
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<tbody>
<tr>
<td>Model Number</td>
</tr>
<tr>
<td>Installer (if known)</td>
</tr>
<tr>
<td>Installer Address</td>
</tr>
<tr>
<td>Installer Phone</td>
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<tr>
<th>History</th>
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<tbody>
<tr>
<td>☐ New product</td>
</tr>
<tr>
<td>☐ 2-5 years</td>
</tr>
<tr>
<td>☐ 5-10 yrs</td>
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<tr>
<td>☐ 10 yrs or longer</td>
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<thead>
<tr>
<th>Proposed substitution affects other parts of the Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ No</td>
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<table>
<thead>
<tr>
<th>Proposed Substitution Similar Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you used this product/item on any other projects</td>
</tr>
<tr>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ No</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Project</th>
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<tbody>
<tr>
<td>Project Address</td>
</tr>
<tr>
<td>Architect/Engineer</td>
</tr>
<tr>
<td>A/E Phone</td>
</tr>
<tr>
<td>Owner</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Owner Phone</td>
</tr>
<tr>
<td>Date installed</td>
</tr>
</tbody>
</table>

**Attached Supporting Data**

- [ ] Drawings
- [ ] Product Data/Specs
- [ ] Samples
- [ ] Tests
- [ ] Reports

**Entity submitting this Substitution Request certifies all of the following:**

- Proposed substitution has been fully investigated and determined to be equivalent or superior in all respects to the specified product, except as may otherwise be specifically and clearly indicated herein.
- If applicable, proposed substitution shall not adversely affect LEED requirements nor shall it prevent achieving the relative number of applicable LEED point[s] the specified product would have received.
- Proposed substitution’s function, appearance, and quality are equal or superior in all respects to the specified product, except as may otherwise be specifically and clearly indicated herein.
- Same or superior warranty and/or guarantees shall be furnished for proposed substitution as is required for the specified product/item.
- Same maintenance service and source replacement parts, as applicable, are available; including local availability.
- Proposed substitution shall have no adverse effect on other trades.
- Proposed substitution shall not affect dimensions and functional clearances.
- Coordination, installation, and changes to the Work as necessary for the accepted proposed substitution shall be complete in all respects.

**Entity’s Information**

- Submitted by
- Signed By
- Date
- Email address of Signee above
- Company Name
- Address
- Phone

**Architect / Engineer Review and Action**

If this Substitution request is approved, it shall be included in an Addendum. If the proposed substitution is not included in an Addendum, then the proposed substitution was rejected; was not submitted in accordance with the Bidding Documents; and/or this Form was not complete. This Form shall be completely filled in to be considered for acceptance.

Approval of this Substitution request is an acceptance of the manufacturer and product/item only for general conformance with the design concept reflected in the Bidding Documents. The A/E has made no attempt to verify specific performance data, or to check details of the proposed substitution as to special features, capacities, physical dimensions, or code and/or regulatory compliance – all of which remain the responsibility of the submitting entity and the Contractor (if not the submitting entity).

**END OF SUBSTITUTION REQUEST FORM**
## Substitution Request Form – After receipt of Bids

All Substitution Requests shall be submitted by the Contractor only. Substitution Requests received from subcontractors, sub-subcontractors, manufacturers, vendors, etc., will be “rejected” without review.

### General Information

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Douglas MacArthur at Taney Avenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/E Project Number</td>
<td>550502</td>
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</tbody>
</table>

### Specified Product/Item Information

<table>
<thead>
<tr>
<th>Specification Title</th>
<th>Section</th>
<th>Page</th>
<th>Article / Paragraph</th>
<th>Description</th>
</tr>
</thead>
</table>

### Proposed Substitution Information

<table>
<thead>
<tr>
<th>Proposed Substitution</th>
<th>Reason for not providing specified product/item</th>
<th>Comparative Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attach a point-by-point comparative data list. Include all differences between the proposed substitution and the specified product/item. If not provided, this Request will be rejected.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manufacturer</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Proposed substitution affects other parts of the Work</th>
<th>Yes</th>
<th>No</th>
</tr>
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<table>
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<tr>
<th>If yes, explain</th>
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<table>
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<tr>
<th>Savings to Owner for accepting proposed substitution</th>
<th>$</th>
</tr>
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</table>

<table>
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<tr>
<th>Proposed substitution affects Contract Time</th>
<th>Yes</th>
<th>No</th>
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</table>

Page 1 of 4
<table>
<thead>
<tr>
<th>Proposed Substitution Similar Installation</th>
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<tbody>
<tr>
<td>Have you (this Contractor) used this</td>
</tr>
<tr>
<td>product/item on any other projects?</td>
</tr>
<tr>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Address</th>
<th>Architect/Engineer</th>
<th>A/E Phone</th>
<th>Owner</th>
<th>Owner Phone</th>
<th>Date installed</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Attached Supporting Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Drawings</td>
</tr>
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</table>
Contractor certifies all of the following:

- Contractor shall provide specified product/item in the event this Substitution request is rejected.
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product, except as may otherwise be specifically and clearly indicated herein.
- If applicable, proposed substitution shall not adversely affect LEED requirements nor shall it prevent achieving the relative number of applicable LEED point[s] the specified product would have received.
- Proposed substitution’s function, appearance, and quality are equal or superior in all respects to the specified product, except as may otherwise be specifically and clearly indicated herein.
- Same or superior warranty and/or guarantees shall be furnished for proposed substitution as is required for the specified product/item.
- Same maintenance service and source replacement parts, as applicable, are available; including local availability.
- Proposed substitution shall have no adverse effect on other trades.
- Cost data as stated herein is complete. Claims for additional costs related to the accepted proposed substitution which may subsequently become apparent shall be waived; including licenses, fees, and/or royalties.
- Proposed substitution shall not affect dimensions and functional clearances. If the proposed substitution does affect dimensions and/or functional clearances, Contractor shall adjust the Work as required and necessary to accommodate the proposed substitution at no additional cost to the Contract.
- Payment shall be made by the Contractor, via a deduct/credit Change Order, for changes to the building design, including A/E fees for the design and detailing, caused by the proposed substitution.
- Coordination, installation, and changes to the Work as necessary for the accepted proposed substitution shall be complete in all respects.

Contractor Information

<table>
<thead>
<tr>
<th>Submitted by</th>
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<tbody>
<tr>
<td>Signed By</td>
</tr>
<tr>
<td>Date</td>
</tr>
<tr>
<td>Email address of Signee above</td>
</tr>
<tr>
<td>Company Name</td>
</tr>
<tr>
<td>Address</td>
</tr>
<tr>
<td>Phone</td>
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</table>
## Architect / Engineer Review and Action

Approval of this substitution request is an acceptance of only the manufacturer and product/item for general conformance with the design concept reflected in the Contract Documents. The A/E has made no attempt to verify specific performance data, or to check the details of the proposed substitution as to special features, capacities, physical dimensions, or code and/or regulatory compliance, all of which remain the responsibility of the Contractor.

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<tbody>
<tr>
<td>☐</td>
<td>Proposed Substitution approved for inclusion in Change Order, if approved by Owner – Provide submittals in accordance with Contract Document requirements.</td>
</tr>
<tr>
<td>☐</td>
<td>Proposed Substitution approved as noted for inclusion in Change Order, if approved by Owner - Provide submittals in accordance with Contract Document requirements.</td>
</tr>
<tr>
<td>☐</td>
<td>Proposed Substitution rejected – Provide specified product/item.</td>
</tr>
<tr>
<td>☐</td>
<td>Proposed Substitution submittal/form not in accordance with Contract Documents (not timely, incomplete)</td>
</tr>
</tbody>
</table>

### Comments / Remarks

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<tbody>
<tr>
<td>Reviewed by</td>
<td></td>
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<tr>
<td>Signed By</td>
<td></td>
</tr>
<tr>
<td>Date</td>
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**END OF SUBSTITUTION REQUEST FORM**
SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
   B. Related Requirements:
      1. Division 01 Section “Substitution Procedures” for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 PROJECT MODIFICATIONS (PM)
   A. Project Modification: Owner or Architect/Engineer may initiate changes by submitting proposed Project Modification to Contractor. Architect will issue a detailed description of proposed changes in the Work that may, or may not, require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
      1. Within time specified in proposed Project Modification after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
         a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
         b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
         c. Include costs of labor and supervision directly attributable to the change.
   B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect and Owner.
      1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
      2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      4. Include costs of labor and supervision directly attributable to the change.
      5. Comply with requirements in Division 01 Section “Substitution Procedures” if the proposed change requires substitution of one product or system for product or system specified.
1.4 ADMINISTRATIVE CHANGE ORDERS

A. Unit-Price Adjustment: See Division 01 Section “Unit Prices” for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Owner will issue a Change Order for signatures of Owner and Contractor on Owner’s standard Change Order form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600
PM # xxx

DATE: xxxx x, xxxx

PROJECT:  Douglas MacArthur at Taney Avenue
Alexandria City Public Schools, Alexandria, VA

CONTRACTOR:

ORIGINATED BY: ( ) CONTRACTOR  ( ) ARCHITECT  ( ) OWNER

DESCRIPTION OF PROPOSED CHANGE:

DRAWING AND SPECIFICATIONS:

Drawing:

Specification:

REASON FOR PROPOSED CHANGE:

RECOMMENDATION AND ACTION TO BE TAKEN:

( ) 1. Submit cost proposal. You are not authorized to proceed with this work.
   Submit proposal by ________.

( ) 2. You are hereby authorized to proceed as outlined above. Please prepare and submit in accordance with the General
   Conditions of this contract a proposal for the work described. A formal Change Order will be issued after approval of
   your proposal by OWNER and ARCHITECT. Your proposal shall include a statement as to the effect this change will
   have on the completion date.
   Submit proposal by ________.

( ) 3. There will be no change in contract price or completion date. You are hereby authorized to proceed as outlined
   above.

( ) 4. The above work to be performed on a T/M cost basis plus a combined overhead and profit not to exceed 20%.

( ) 5. The above work shall be performed in accordance with Contract Unit Prices.

( ) 6. Submit credit for consideration. Submit proposal by ________________________

Authorized by:  Olivia Brookman
Project Manager
Moseley Architects

CC:  Mike Quadrino (B&D)
Kevin Picken (B&D)
Paul May (ACPS)
Bill Brown (Moseley Architects)
SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
   a. Application for Payment forms with continuation sheets.
   b. Submittal schedule.
   c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date but no later than 7 days before the date scheduled for submittal of initial Applications for Payment.

3. Sub-schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub-schedules showing values correlated with each element.

B. Format and Content: Use the Project Manual table of contents format (specification section numbers and names) to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:
   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      1) Labor.
      2) Materials.
      3) Equipment.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of 5 percent of Contract Sum or as appropriate.
   a. Include separate line items under Contractor and principal subcontracts for project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
9. Each item in the schedule of values and Applications for Payment shall be complete.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor’s option.
10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
B. Payment Application Times: Contractor shall submit application for payment at regularly scheduled pay meetings as established at the Pre-Construction Conference. The period covered by each Application for Payment shall be clarified at the Pre-Construction Conference.
C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
   1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
   2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
   3. Provide summary documentation for stored materials indicating the following:
      a. Materials previously stored and included in previous Applications for Payment.
      b. Work completed for this Application utilizing previously stored materials.
      c. Additional materials stored with this Application.
      d. Total materials remaining stored, including materials with this Application.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values.
   3. Contractor's construction schedule (preliminary if not final).
   4. Products list (preliminary if not final).
   5. Schedule of lump sum and unit prices.
   6. Submittal schedule (preliminary if not final).
   7. List of Contractor's staff assignments.
   8. List of Contractor's principal consultants.
   11. Initial progress report.
   13. Certificates of insurance and insurance policies.
   15. Data needed to acquire Owner's insurance.
H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.

2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.


5. AIA Document G707, “Consent of Surety to Final Payment.”

6. Evidence that claims have been settled.

7. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900
SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS
   A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
      1. Name, address, and telephone number of entity performing subcontract or supplying products.
      2. Number and title of related Specification Section(s) covered by subcontract.
      3. Drawing number and detail references, as appropriate, covered by subcontract.
   B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
      1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.4 GENERAL COORDINATION PROCEDURES
   A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
      1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
      2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
      3. Make adequate provisions to accommodate items scheduled for later installation.
   B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
      1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.1 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
   a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
   b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
   c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
   e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
   f. Indicate required installation sequences.
   g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
3. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
4. BIM File Incorporation: Construction Manager will incorporate Contractor's coordination drawing files into Building Information Model established for Project.
   a. Construction Manager will perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
5. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
   a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
   b. Digital Data Software Program: Drawings are available in Revit 2019 operating in Microsoft Windows operating system.

Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect

1.2 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
3. RFIs that would be clearly answered by simply reading the Contract Documents and that are not open to reasonable misinterpretation therefrom may be deemed "frivolous" by the Architect. The cost in time and materials to respond to frivolous RFI's shall be the responsibility of the Contractor.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.

11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

12. Contractor's signature.

13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
   a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 7 working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for approval of Contractor's means and methods.
   d. Requests for coordination information already indicated in the Contract Documents.
   e. Requests for adjustments in the Contract Time or the Contract Sum.
   f. Requests for interpretation of Architect's actions on submittals.
   g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to conditions of the Contract.
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at intervals as established. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
1.3 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

2. Agenda: The Architect will prepare the meeting agenda and distribute it to all invited attendees.

3. Minutes: The Architect will record significant discussions and agreements achieved. Within 7 days of the meeting the Architect will distribute the meeting minutes to the Owner, the Architect’s consultants, and to the Contractor for distribution to his personnel and attending major subcontractors, manufacturers, suppliers and other concerned parties.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. The Architect shall conduct the meeting to review responsibilities and personnel assignments.

1. Conduct the conference to review responsibilities and personnel assignments.

2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect progress, including the following:

   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.
   e. Lines of communications.
   f. Procedures for processing field decisions and Change Orders.
   g. Procedures for RFI’s.
   h. Procedures for testing and inspecting.
   i. Procedures for processing Applications for Payment.
   j. Distribution of the Contract Documents.
   k. Submittal procedures.
   l. Air barrier requirements.
   m. Coordination and submittal of color & finish related selections.
   n. Preparation of record documents.
   o. Use of the premises.
   p. Work restrictions.
   q. Working hours.
   r. Responsibility for temporary facilities and controls.
   s. Procedures for moisture and mold control.
   t. Procedures for disruptions and shutdowns.
   u. Construction waste management and recycling.
   v. Parking availability.
   w. Office, work, and storage areas.
x. Equipment deliveries and priorities.
y. First aid.
z. Security.
aa. Progress cleaning.

4. Minutes: Architect will record and Contractor will distribute meeting minutes.

C. Construction Indoor Air Quality (IAQ) Management Plan Development Session: (Refer to Division 1 section “Indoor Air Quality Requirements.”)
   1. Schedule: Schedule a Construction Indoor Air Quality Management planning session at the Project site or other convenient location no later than forty-five (45) days after execution of the Agreement and prior to commencement of wall assembly construction activities. Conduct the meeting to review responsibilities and personnel assignments.
   2. Attendees: The Owner, Architect, Mechanical Engineer, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
   3. Agenda:
      a. Protection: Discussion of how and where materials that could impact IAQ will be stored, including but not limited to:
         1) Insulation.
         2) Gypsum board.
         3) Flooring materials.
         4) Ceiling panels.
         5) Furnishings.
         6) Odorous chemicals.
      b. Protection: Discussion of how HVAC equipment will be stored, installed, and operated during construction.
      c. Pathway Interruption: Discussion of how airflow between construction zones will be limited to prevent the spreading of pollutants from one part of the building to another.
      d. Housekeeping: Discussion of how the building will be kept clean and dry.
      e. Scheduling: Discussion of what wet (odor emitting) materials will be used on this project, in order to schedule their installation before fuzzy (odor absorbing) materials

D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction. Contractor conducts conferences, records and distributes meeting minutes.
   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, shall attend the meeting. Advise Architect of scheduled meeting dates.
   2. Agenda: Contractor shall review of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
      b. Options.
      c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Air barrier requirements.
r. Temporary facilities and controls.
s. Space and access limitations.
t. Regulations of authorities having jurisdiction.
u. Testing and inspecting requirements.
v. Installation procedures.
w. Coordination with other work.
x. Required performance results.
y. Protection of adjacent work.
z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

E. Progress Meetings: The Architect shall conduct progress meetings at monthly intervals.

1. Coordinate dates of meetings with preparation of payment requests.

2. Attendees: Representatives of the Owner, the Architect and the Contractor shall be represented at each of these meetings. Design consultants, Subcontractors, suppliers, and other entities concerned with current progress or involved in planning, coordination, or performance of future activities may be invited to attend these meetings on an as needed basis to resolve specific issues. All participants at these meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do
so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:
   1) Interface requirements.
   2) Sequence of operations.
   3) Status of submittals.
   4) Deliveries.
   5) Off-site fabrication.
   6) Access.
   7) Site utilization.
   8) Temporary facilities and controls.
   9) Progress cleaning.
      a) Progress of Construction Waste Management
      b) Progress of Indoor Air Quality Management
   10) Quality and work standards.
   11) Status of correction of deficient items.
   12) Field observations.
   13) Status of RFIs.
   14) Field Clarification. (FC)
   15) Status of proposal requests.
   16) Pending changes. (Potential Change Order – PCO)
   17) Status of Change Orders. (CO)
   18) Pending claims and disputes.
   19) Documentation of information for payment requests.

4. Minutes: Architect will record and Contractor will distribute meeting minutes.

5. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100
SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS (for information only; no action will be taken by the Architect)
A. Submittal Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
   1. Scheduled date for each submittal.
   2. Specification Section number and title.
   3. Submittal category (action or informational).
   4. Name of subcontractor.
   5. Description of the Work covered.
   6. Scheduled date for Architect's final release or approval.
B. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
   1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
C. Daily Construction Reports: Submit 2 copies at monthly intervals.
D. Field Condition Reports: Submit 2 copies at time of discovery of differing conditions.
E. Special Reports: Submit 2 copies at time of unusual event.

1.3 COORDINATION
A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
B. Coordinate Contractor's Construction Schedule with the Submittals Schedule, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from parties involved.
   2. Coordinate each construction activity with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTAL SCHEDULE
A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by Contractor’s Construction Schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
   1. Coordinate Submittals Schedule with Contractor's Construction Schedule.
a. At Contractor's option, show submittals on the Construction Schedule, instead of tabulating them separately.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. Procedures: Prepare precedence diagram network using AON (activity-on-node) format. Comply with procedures contained in AGC's “Construction Planning & Scheduling.”

B. Time Frame: Extend schedule from date established for Commencement of the Work to date of Final Completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Preliminary Network Diagram: Submit diagram within 14 days of date established for Commencement of the Work. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work based on indicated activities.

D. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, time-scaled CPM network analysis diagram for the Work.
   1. Develop network diagram for Owner review no later than 30 days after date established for Commencement of the Work.
      a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all Work within applicable completion dates.
   2. Use “one workday” as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

E. Activities: Treat each story or separate area as a separate activity for each principal element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
   2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   4. Startup and Testing Time: As a predecessor to Substantial Completion include activities of reasonable duration for startup and testing of equipment. Schedule should include activities for individual / specific areas, not just one activity for entire project.
   5. Building Commissioning and Testing: As a predecessor to Substantial Completion include a reasonable duration period for building commissioning and testing.
   6. Substantial Completion: Indicate completion of work activities in advance of the date established for Substantial Completion, and include separate activities for Architect's administrative procedures necessary for certification of Substantial Completion.
F. CPM Schedule Preparation and Constraints: Prepare a list of all activities required to complete the Work. Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.

2. Work by Others: Include a separate activity for each portion of the Work performed by Owner or other contractors necessary for the completion of the Work.

3. Owner-Furnished Products: Include a separate activity for each product. Coordinate delivery dates established by Owner with the project schedule.

4. Owner-Furnished Permanent Utilities: Include separate activities indicating when permanent utilities are required.

5. Activities and Work Restrictions: Indicate estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames and show the effect of the following items on the schedule as applicable:
   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Utility interruptions.
   d. Uninterruptible services.
   e. Partial occupancy before Substantial Completion.
   f. Use of premises restrictions.
   g. Provisions for future construction.
   h. Seasonal variations.
   i. Environmental control.
   j. Preparation and processing of submittals.
   k. Mobilization and demobilization.
   l. Work by Owner that may affect or be affected by Contractor's activities.

6. Work Stages: Indicate estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Fabrication.
   b. Installation.
   c. Tests and inspections, including commissioning.
   d. Adjusting.
   e. Startup and placement into final use and operation.

7. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
   a. Structural frame completion.
   b. Permanent building enclosure.
   c. Substantial Completion of mechanical installation.
   d. Substantial Completion of electrical installation.
   e. Substantial Completion.
   f. Final Completion.

8. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
9. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

G. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed (Commencement of the Work), Substantial Completion, and Final Completion.

H. Initial Issue of Schedule: Prepare initial network diagram from a list of straight “late finish-total float” sort. Identify critical activities. Prepare tabulated reports showing the following:
   1. Description of activity.
   2. Early and late start dates.
   3. Early and late finish dates.
   5. Total float or slack time.

I. Submittal of the Final Construction Schedule by the Contractor certifies that the work will be prosecuted in accordance with the Schedule, subject to any change therein which is implemented in accordance with the Contract Documents.

J. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
   1. Identification of all activities and relationships that have changed.
   2. Changes in early and late start dates.
   3. Changes in early and late finish dates.
   5. Changes in the critical path.
   6. Changes in total float or slack time.

K. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

L. Computer Software: Prepare schedules using SureTrak Project Manager or alternate software acceptable to Owner and Architect.

2.3 RECOVERY SCHEDULE

A. Should the updated Construction Schedule show at any time during Contractor’s performance, in the sole opinion of the Owner, that the Contractor is fourteen (14) or more days behind schedule for any Specific Date, or should Contractor be required to undertake actions under the General Conditions hereof, the Contractor shall prepare a Recovery Schedule at no additional cost to the Owner (unless the sole responsibility for the event or occurrence which has caused the schedule slippage is through no fault of the Contractor) explaining and displaying how Contractor intends to reschedule the Work in order to regain compliance with the Construction Schedule during the immediate subsequent pay period.

B. Recovery Schedule Requirements:
   1. The Contractor shall prepare and submit to the Owner a one-month maximum duration Recovery Schedule, which demonstrates how the progress of the Work will return to the approved Construction Schedule at the earliest possible time. Prepare the Recovery
Schedule to same level of detail as the Construction Schedule. This Recovery Schedule shall be prepared in coordination with other separate contractors on the Project.

2. Contractor shall advise the Owner of the effectiveness of the Recovery Schedule during the schedule recovery time period. At the conclusion of the one month schedule recovery period, the Owner will direct the Contractor as follows:

   a. If Owner determines the Contractor is still behind schedule, Owner will direct the Contractor to prepare a Schedule Revision and comply with all of the requirements of a Schedule Revision as stated herein and the other requirements of the Contract Documents; provided, however, that nothing herein shall limit in any way the rights and remedies of the Owner as provided elsewhere in the Contract Documents.
   
   b. If the Owner determines the Contractor has successfully complied with provisions of the Recovery Schedule, the Owner will direct the Contractor to return to the use of the approved Construction Schedule.

2.4 SCHEDULE REVISIONS

A. Should Contractor desire to or be required under the Contract Documents to make modifications or changes in his method of operation, his sequence of Work or the durations of activities in the Construction Schedule, the Contractor shall do so in accordance with requirements of Contract Documents. Revisions to the approved Construction Schedule shall be identified by Contractor in writing and approved in writing by Owner prior to incorporation into the approved schedule.

B. Logic modifications associated with change orders shall affect only those activities and performance dates directly concerned. Adjustments in scheduled intermediate Completion Dates or for the Contract as a whole will be considered only to the extent that there is insufficient remaining float to absorb these changes.

C. Revisions to Contractor’s Construction Schedule required under terms of this Section shall not modify the Contract Time or any Milestone Date and shall not modify or limit the Contractor’s obligations under this Contract.

D. If there are separate contractors on the Project, prior to the submission by the Contractor of proposed schedule revision, the Contractor shall meet with and gain written approval of the separate contractors to make the revisions which shall be evidenced by the signatures of said separate contractors on the proposed schedule revisions. If accepted by the Owner the revisions shall be binding upon Contractor and all separate contractors on the Project.

E. Submittal of any proposed schedule revisions by the Contractor certifies that he will prosecute the Work in accordance with the schedule revision, subject to any change therein which is implemented in accordance with the Contract Documents.

2.5 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording, at a minimum, the following information concerning events at Project site:

   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
6. High and low temperatures and general weather conditions.
7. Meetings and significant decisions.
8. Unusual events (refer to special reports).
9. Stoppages, delays, shortages, and losses.
10. Meter readings and similar recordings.
11. Orders and requests of authorities having jurisdiction.
12. Change Orders received and implemented.
13. Construction Change Directives received and implemented.
14. Services connected and disconnected.
15. Equipment or system tests and startups.
16. Partial Completions and occupancies.
17. Substantial Completions authorized.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report with a request for interpretation on CSI Form 13.2A or alternate form acceptable to Architect. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.6 SPECIAL REPORTS
A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE
A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 1 week in advance of the regularly scheduled progress meeting designated for the review of the project schedule by the Architect.
1. Revise schedule after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Start Dates, Actual Finish Dates and an accurate Completion Percentage for each activity.
B. Distribution: Distribute copies of approved schedule to Architect, Owner, and additional parties determined by the Contractor.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200
SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes requirements for submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS
   A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
   B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
   C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

1.4 SUBMITTAL SCHEDULE
   A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.
      1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
      2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
      3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
         a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Electronic (CADD) Files: The Contractor may request electronic (CADD) files utilizing the Architect’s Request Form.

B. Completeness: Submittals shall be complete in every respect and bound in sets. Each Submittal shall be clearly marked to show each item, component and optional feature proposed to be incorporated into the Project.
   1. Incomplete submittals may be returned without action. Incomplete submittal packages returned without action or for additional information are not subject to delay claims.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
   3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
   4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
   5. Color Selection: In individual specification sections, specific items are identified which require color/finish selections to be made by the Architect from color chart or sample submittals. The Submittal Schedule prepared according to “Submittal Schedule” paragraph above, shall identify these required color/finish submittals. The Architect will make coordinated selections of colors/finishes for the building interior, present the resulting color concepts to the Owner for approval, and prepare the actual Color Schedule for the Work.
      a. Submittals requiring color selection must be submitted by Contractor and approved by Architect for conformance with Contract Documents prior to the start of the color selection process. When the submittals have been approved for conformance with Contract Documents, the process for color selection, presentation of color concepts, Owner approval, and Color Schedule preparation will begin.
      b. After approval of all interior color related submittals for conformance with Contract Documents, the Contractor shall allow a minimum of thirty (30) days for the color selection, Owner’s approval process, and preparation of the Color Schedule.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, in accordance with General Conditions and as follows. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow sufficient time days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow sufficient time days for review of each resubmittal.

4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing or to allow for a resubmittal, if necessary.

E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

4. Include the following information on an inserted cover sheet:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Contractor.
   e. Name of firm or entity that prepared submittal.
   f. Name of subcontractor.
   g. Name of supplier.
   h. Name of manufacturer.
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Location(s) where product is to be installed, as appropriate.
   l. Related physical samples submitted directly.
   m. Other necessary identification.

5. Include the following information as keywords in the electronic file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.

F. Options: Identify options requiring selection by the Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals. Submittals without deviations identified will be considered to be in compliance with all requirements.

H. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

1. Transmittal Form: Use AIA Document G810, or other approved form.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. Action Submittals, for each specification section, shall be submitted as a complete package.
   1. Electronic submittals are acceptable on this project. Prior to construction, the Contractor and Architect shall discuss the method for exchanging files. Use of the Architect’s Newforma InfoExchange website and procedures can be used at no charge. If the Contractor chooses to use a different platform and methodology:
      a. The Architect may reject the methodology or platform proposed and.
         1) use the Architect’s Newforma InfoExchange website, or
         2) the project team will revert to traditional hard-copy exchange
      b. or the Contractor shall bear the cost of software, licensing, training etc for the project team to participate.
   2. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section “Closeout Procedures.”
   3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
      a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
      b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
   4. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section “Quality Requirements.”

B. If a specified product is provided, submit only Action Submittals and where designated, Closeout Submittals, unless directed otherwise by the Architect. The Contractor shall certify compliance with all requirements.
2.2 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections. Action Submittals, for each section, shall be submitted as a complete package.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's catalog cuts.
      b. Manufacturer's product specifications.
      c. Manufacturer's printed and published installation instructions.
      d. Standard color charts.
      e. Statement of compliance with specified referenced standards.
      f. Testing by recognized testing agency.
      g. Application of testing agency labels and seals.
      h. Notation of coordination requirements.
      i. Availability and delivery time information.
   4. For equipment, include the following in addition to the above, as applicable:
      a. Wiring diagrams showing factory-installed wiring.
      b. Printed performance curves.
      c. Operational range diagrams.
      d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   5. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.
   2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

E. Delegated-Design Services:

1. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   a. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

2. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally-signed PDF electronic file and three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

F. Application for Payment: Comply with requirements specified in Division 01 Section “Payment Procedures.”

2.3 INFORMATIONAL SUBMITTALS

A. Schedule of Values: Comply with requirements specified in Division 01 Section “Payment Procedures.”

B. Contractor’s Construction Schedule: Comply with requirements specified in Division 01 Section “Construction Progress Documentation.”
C. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Submit subcontract list as PDF electronic file.

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

F. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.
M. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section “Quality Requirements.”

N. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

O. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

P. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Q. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.4 CLOSEOUT SUBMITTALS (AND MAINTENANCE MATERIAL SUBMITTALS)

A. Comply with requirements specified in Division 1 Section "Closeout Procedures."

B. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections required, and return it. The Architect will attach a comment sheet that will indicate what “action” the Contractor shall take. “Actions” and review procedure will be clarified at the Preconstruction Conference.
C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval as noted from Architect.

E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300
SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
   1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on the project site, consisting of multiple products, assemblies and subassemblies.
D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a construction operation, including installation, erection, application, and similar operations.
   1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
J. Experienced: When used with an entity or individual, “experienced” means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.
   1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.
   2. Main wind-force resisting system or a wind-resisting component listed in the wind-force- resisting system quality assurance plan prepared by the Architect.

D. Testing Agency Qualifications: For testing agencies specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.
1.5 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
   1. Project quality-control manager.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:
   1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
   2. Special inspections required by authorities having jurisdiction and indicated on the “Statement of Special Inspections.”

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

C. Factory- Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of factory-authorized service representative making report.
   2. Statement that equipment complies with requirements.
   3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   4. Statement whether conditions, products, and installation will affect warranty.
   5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems 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. Fabricator Qualifications: A firm experienced 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.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

   1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

   1. Contractor responsibilities include the following:

      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
      d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
      e. When testing is complete, remove test specimens and assemblies; do not reuse products on Project.

   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
K. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual specification sections, along with supporting materials.

1. Preinstallation Conference: Conduct conference at Project site of the Contractor, contributing trades, ABAA auditor, and air barrier manufacturer’s technical representative. Advise Architect and Owner of scheduled meeting date. Review methods and procedures related to masonry veneer, SPF insulation, and air barrier terminations at boundaries and masonry openings, including, but not limited to, the following:
   a. Meet with Architect and installing trade superintendents.
   b. Review materials, methods and sequence to incorporate continuous air barrier construction in accordance with Division 1 Section “Exterior Building Enclosure Air Barrier Requirements.”
   c. Review methods and procedures related to masonry veneer installation, including sequencing of masonry flashing, air barrier materials, installation of glazed framing systems and installation of masonry veneer. Review method for keeping air cavity free of mortar droppings.
   d. Review flashings, weep holes, cavity drainage, and condition of other construction that will affect brick veneer wall performance.
   e. Review methods and procedures related to installation of MCM panel veneer, including installation of cavity insulation-air barrier materials, continuous insulation framing, and MCM panels. Review integration of these cladding components with installation of glazed framing systems.
   f. Demonstrate proposed method for keeping the cavity free of mortar droppings.
   g. Confirm head anchorage of glazed framing systems at steel lintel will not penetrate or damage flashing.
   h. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.

3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section “Submittal Procedures.”

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

   1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of the Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
   1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL INSPECTIONS AND TESTS

A. Special Inspections and Tests: Owner will engage a qualified special inspector to conduct special inspections and tests required by authorities having jurisdiction as the responsibility of Owner, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
   2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section “Execution.”

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000
SECTION 014200 – REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. General: Basic Contract definitions are included in the General Conditions of the Contract. The definitions of this section are in addition to, not in place of, those found in the General Conditions.
B. “Approved”: When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
C. “Directed”: A command or instruction by Architect. Other terms including “requested,” “authorized,” “selected,” “required,” and “permitted” have the same meaning as “directed.”
D. “Indicated”: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including “shown,” “noted,” “scheduled,” and “specified” have the same meaning as “indicated.”
E. “Regulations”: Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
F. “Furnish”: Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
G. “Install”: Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
H. “Installer”: An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Using a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter.” It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
I. “Provide”: Furnish and install, complete and ready for the intended use.
J. “Project Site”: Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
K. The term “experienced,” when used with the term “installer,” means having successfully completed a minimum of 5 previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
L. “Replace”: The term “replace” means to provide an acceptable like product or material in the place of a missing or unacceptable (rejected) product or material. To “replace” an unacceptable
product or material includes its removal and disposal. (The term “reinstall” shall be used to indicate reuse of the original.)

M. “Punch List” (AIA A201): A “punch list” is a listing of work items required by the Contract Documents which are incomplete or non-conforming. The list of observed deficiencies is compiled in the course of review to determine if the Contractor has attained Substantial Completion. It does not constitute a definitive list of remaining work items, and does not limit, amend or supersede requirements of the Contract Documents. Completion of punchlist items is a requirement to achieve Substantial Completion, in accordance with the General Conditions.

N. “Written” or “Printed” when used in conjunction with manufacturer’s product handling and installation requirements means to comply with the manufacturer’s current printed and published information.

1.3 INDUSTRY STANDARDS
A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

E. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research’s “Encyclopedia of Associations” or Columbia Books’ “National Trade & Professional Associations of the U.S.,” which are available in most libraries.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES
   A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
   B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
   C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
   D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.
   E. Internet Service: Pay ISP use charges for Internet service, for use by all parties engaged in construction, at Project site.

1.4 INFORMATIONAL SUBMITTALS
   A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
   B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
   C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
      1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
      2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
      3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
D. Dust-, Silica- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-, silica-, and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
1. Locations of dust- and silica-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
5. Other dust- and silica-control measures.

1.5 QUALITY ASSURANCE
A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board’s ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
D. Comply with OSHA requirements as they relate to the type of Work required, including but not limited to, silica-control measures.

1.6 PROJECT CONDITIONS
A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS
2.1 MATERIALS
A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top rails. Contractor may provide either fixed or portable fencing to suit conditions. For portable fencing, provide concrete or galvanized steel bases for supporting posts.
B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts.
C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
D. Dust- and Silica-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
   1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
   2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
   3. Drinking water and private toilet.
   4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
   5. Lighting fixtures sufficient to maintain average illumination of 20 fc at desk height.
   6. Maintain the following materials, specified elsewhere, in the field office available to Architect and Owner’s representative at all times:
      a. Maintain up-to-date set of Contract Documents, including FCs, RFIs, PCOs and COs.
      b. Maintain up-to-date set of reviewed final shop drawings.
      c. Maintain up-to-date Contractor’s Progress Schedule.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
   1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
   3. The contractor shall have the responsibility to operate the heaters in a manner that provides a safe working environment as well as maintaining the required temperatures for performance of the work.
   4. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section “Closeout Procedures.”
C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION
A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
A. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel.
   2. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
      a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
   4. Drinking-Water: Bottled-water, drinking-water units, or drinking water fountains connected to permanent or temporary potable water source.
C. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
   1. Provide measures and equipment to meet warranty requirements of interior woodwork, specified in Division 6 and 12 Sections.
D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
   1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
   2. If permanent lighting is not available at time of installation of interior finishes, provide temporary lighting that simulates permanent lighting conditions during installation of interior finishes.

G. Telephone/Cable Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
   1. Provide additional telephone lines for the following:
      a. Provide a dedicated telephone line for each facsimile machine in each field office.
   2. At each telephone, post a list of important telephone numbers.
      a. Police and fire departments.
      b. Ambulance service.
      c. Contractor's home office.
      d. Contractor's emergency after-hours telephone number.
      e. Architect's office.
      f. Engineers' offices.
      g. Owner's office.
      h. Principal subcontractors' field and home offices.
   3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

H. Electronic Communication Service: Provide high speed Internet service for use by all construction forces.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
   2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
3. Establish a smoking area outside the building for construction personnel since smoking within the building will not be permitted.

B. Temporary Construction Entrance: Construct and maintain construction entrance adequate for construction operations. Locate temporary construction entrance as indicated on Drawings.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   1. Protect existing site improvements to remain including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

F. Project Identification and Temporary Signs: Provide Project identification and other signs, comply with layout and details indicated on Drawings. Submit proposed sign for Owner approval. Install signs in location(s) to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
   1. Provide temporary, directional signs for construction personnel and visitors.
   2. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Division 01 Section “Execution.”

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental, OSHA, and other regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Division 01 Section “Summary.”

B. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 31 Section “Site Clearing” and on Civil Drawings.

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
F. Temporary Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
   1. Extent of Fence: As indicated on Drawings.
   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

3.5 MOISTURE AND MOLD CONTROL


B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
   1. Protect porous materials from water damage.
   2. Protect stored and installed material from flowing or standing water.
   3. Keep porous and organic materials from coming into prolonged contact with concrete.
   4. Remove standing water from decks.
   5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Periodically collect and remove waste containing cellulose or other organic matter.
   4. Discard or replace water-damaged material.
   5. Do not install material that is wet.
   6. Discard, replace, or clean stored or installed material that begins to grow mold.
   7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   2. Use permanent HVAC system to control humidity.
   3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
      a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
      b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of
exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary enclosures, partitions, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve required results and to avoid possibility of damage and violations with federal, state, local regulations.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
   2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
   3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section “Closeout Procedures.”

END OF SECTION 015000
SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and equivalent products.

1.3 DEFINITIONS
A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term “product” includes the terms “material,” “equipment,” “system,” and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Equivalent Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that are equivalent to or exceed those of specified product.
B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product" or "basis-of-design standard", including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating equivalent products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS
A. Equivalent Product Requests: Submit request for consideration of each equivalent product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Include data to indicate compliance with the requirements specified in “Equivalent Products” Article.
   2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation of an equivalent product request. Architect will notify Contractor of approval or rejection of proposed equivalent product request.
B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section “Submittal Procedures.” Show compliance with requirements.
1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product equivalent with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   6. Protect stored products from damage and liquids from freezing.
   7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces, if any. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section “Closeout Procedures.”

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term “as selected,” Architect will make selection.

B. Product Selection Procedures:
   1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Equivalent products or substitutions for Contractor's convenience will not be considered.
   2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Equivalent products or substitutions for Contractor's convenience will not be considered.
   3. Products:
      a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Equivalent products or substitutions for Contractor's convenience will not be considered.
      b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in “Equivalent Products” Article for consideration of an unnamed product.
   4. Manufacturers:
a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Equivalent products or substitutions for Contractor's convenience will not be considered.

b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in “Equivalent Products” Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or an equivalent product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in “Equivalent Products” Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require “match Architect's sample”, provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section “Substitution Procedures” for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase “as selected by Architect from manufacturer's full range” or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 EQUIVALENT PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for equivalent product when all of the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.
PART 3 - EXECUTION (Not Used)

END OF SECTION 016000
SECTION 017300 – EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.3 INFORMATIONAL SUBMITTALS
A. Qualification Data: For land surveyor.
B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.4 QUALITY ASSURANCE
A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
   1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
   2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include, but are not limited to, the following:
      a. Primary operational systems and equipment.
      b. Fire separation assemblies.
      c. Air or smoke barriers.
      d. Fire-suppression systems.
      e. Mechanical systems piping and ducts.
      f. Control systems.
      g. Communication systems.
      h. Conveying systems.
      i. Electrical wiring systems.
j. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include, but are not limited to, the following:
   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Equipment supports.
   e. Piping, ductwork, vessels, and equipment.
   f. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Comply with manufacturer's current printed and published (written) instructions and recommendations for storing and installing products and equipment in applications indicated. Maintain copies on-site.

PART 2 - PRODUCTS

2.1 MATERIALS
A. General: Comply with requirements specified in other Sections.
   1. For all battery-operated devices, provide batteries rated for operation for at least one year.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 PREPARATION
A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section “Project Management and Coordination.”

E. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages in the construction.

F. Coordinate delivery of items to Project site.

3.2 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level and plumb, of every major element as the Work progresses.
   5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
   6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.3 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
   1. Where batteries are not provided with battery-operated devices, install batteries.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

6. Proceed with patching after construction operations requiring cutting are complete.

E. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.

F. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
      a. Utilize containers intended for holding waste materials of type to be stored.
   4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section “Construction Waste Management and Disposal.”

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure, including silica, during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Replace failing batteries.

D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section “Quality Requirements.”

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300
SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.3 SUBMITTALS

A. Waste Management Plan: Submit 3 copies of a fully complete plan within 30 days of date established for commencement of the Work.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include the following information:

1. Spreadsheet tabulating total waste material, quantities diverted and means by which each material is diverted, and statement that requirements for the credit have been met. Architect will assist with preparation of spreadsheet or upon request provide one to be used for project.

2. All records substantiating the information reported on the spreadsheet, including manifests, weight tickets, receipts, and invoices. Records must be legible and must indicate the date issued, the waste material donated, the weight (in tons) or volume (in cubic yards) of material, and the name, address, and phone number of the receiving entity. The following records must be submitted:

a. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

b. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

c. Recycling and Processing Facility Records: Indicate receipt and acceptance of recycled waste by recycling and processing facilities licensed to accept them. Include manifests, weight, tickets, receipts, and invoices.
d. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.4 QUALITY ASSURANCE
A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section “Project Management and Coordination.” Review methods and procedures related to waste management including, but not limited to, the following:
1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.5 WASTE MANAGEMENT PLAN
A. General: Develop a waste management plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
1. The Waste Management Plan shall contain the following information, as a minimum:
   a. A spreadsheet, which lists:
      1) Each waste stream leaving the site (example: steel, concrete, cardboard, trash).
      2) The name and address of the receiving entity.
      3) Contact name and phone number at the receiving entity.
   b. A narrative, which describes:
      1) Who is the primary person responsible for implementing the CWM plan.
      2) What wastes must be separated for recycling.
      3) How hazardous wastes are to be handled.
      4) How the construction waste management plan, including updates, will be communicated to all involved parties (example: CWM will be on the agenda of all construction progress meetings).
      5) How the construction waste management plan will be enforced.
      6) How data will be tracked and filed (important: receipts must be legible and must include the name of the hauler, the date hauled, the material hauled, the weight or volume of material hauled).
PART 2 - PRODUCTS

2.1 RESOURCES

A. The Architect will provide a list of potential resources upon request at the Preconstruction Conference, for information purposes. The Architect does not recommend or approve any of the listed entities. See also U.S. General Services Administration (GSA) online Construction Waste Management Database http://www.wbdg.org/tools/cwm.php.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 1 Section “Temporary Facilities and Controls” for operation, termination, and removal requirements.

B. Waste Management Coordinator: Designate a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.

2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

2. Comply with Division 1 Section “Temporary Facilities and Controls” for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Procedures:

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.

5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419
SECTIONS 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.

1.3 ACTION SUBMITTALS
A. Product Data: For cleaning agents.
B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS
A. Certificates of Release: From authorities having jurisdiction.
B. Certificate of Insurance: For continuing coverage.
C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS
A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 ABOVE-CEILING WORK:
A. Complete above-ceiling work prior to installation of finish ceilings. Coordinate with the Owner's third-party contractors, such as data network and security systems, if any.
B. Complete or correct deficiencies, if any, noted by Architect, Owner and local authorities having jurisdiction or confirm with Architect that any such deficiencies may be completed or corrected at a later date without obstructing installation of ceilings.
C. Coordinate with local authorities having jurisdiction to obtain required above-ceiling reviews. Complete or correct above-ceiling work to comply with directives issued by the reviewing authorities. Upon completion or correction, certify in writing that all the items cited by reviewing authority have been completed or corrected and submit copies to the local authority, Owner, and Architect.
D. Following completion of Items A, B and C above, the ceiling may be “enclosed.” Coordinate installation of acoustical ceiling hold-down clips, if any, with late stage activities such as HVAC testing and balancing and data network testing.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete. Substantial Completion shall be for entire scope of Work (for example, both building and sitework) unless Owner has previously agreed to an alternative arrangement.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
   a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain signature of Owner’s agent for receipt of submittals.

5. Submit test/adjust/balance records.

6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment. Demonstrate that air and water systems are balanced and that automatic temperature control system is in control of all equipment as indicated. This may require separate demonstrations if controls cannot be tested for applicable seasons of the year.

4. Submit written certification that all special inspections have been completed.
5. Submit written certification that testing/adjusting/balancing operations have been completed, and that systems are operational and under control in conformance with requirements of Division 1.
6. Complete testing of the electronic security and related detention equipment demonstrating security control.
7. Perform preventive maintenance on equipment used prior to Substantial Completion.
8. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section “Demonstration and Training.”
10. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
11. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
12. Complete final cleaning requirements, including touchup painting.
13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.8 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 “Payment Procedures.”

2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding interior in numbered order of Architect’s finish schedule.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Include the following information at the top of each page:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Contractor.
   e. Page number.

4. Submit list of incomplete items in the following format:

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title “WARRANTIES,” Project name, and name of Contractor.

4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
CLOSEOUT PROCEDURES

DOUGLAS MACARTHUR AT TANEY AVENUE
ALEXANDRIA CITY PUBLIC SCHOOLS, ALEXANDRIA, VA
Architect’s Project No: 550502

1. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

n. Replace disposable air filters and clean permanent air filters. Filtration media installed at the end of construction shall have a Minimum Efficiency Reporting Value (MERV) of 13. Clean exposed surfaces of diffusers, registers, and grilles.

o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.


p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Division 1 Section “Temporary Facilities and Controls.” Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Division 1 Section “Construction Waste Management and Disposal.”

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over “UL” and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700
SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for project record documents, including the following:
      1. Record Drawings.
      2. Record Specifications.
      3. Record Product Data.
      4. Miscellaneous record submittals.

1.3 CLOSEOUT SUBMITTALS
   A. Record Drawings: Comply with the following:
      1. Number of Copies: Submit copies of record Drawings as follows:
         a. Initial Submittal:
            1) Submit PDF electronic files of scanned record prints.
            2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
         b. Final Submittal:
            1) Submit PDF electronic files of scanned record prints.
            2) Print each drawing, whether or not changes and additional information were recorded.
   B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
   C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.
      1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
   D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy and annotated PDF electronic files and directories of each submittal.
   E. Reports: Submit written report indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.
PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Changes made by Change Order or Construction Change Directive.
   k. Changes made following Architect's written orders.
   l. Details not on the original Contract Drawings.
   m. Field records for variable and concealed conditions.
   n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.

3. Refer instances of uncertainty to Architect for resolution.

   a. See Section “Submittal Procedures” for requirements related to use of Architect's digital data files.
   b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each record Drawing; include the designation “PROJECT RECORD DRAWING” in a prominent location.
   1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
   3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
   4. Identification: As follows:
      a. Project name.
      b. Date.
      c. Designation “PROJECT RECORD DRAWINGS.”
      d. Name of Architect.
      e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   3. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as paper copy and scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as scanned PDF electronic file(s) of marked-up paper copy of Product Data.
   1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy and scanned PDF electronic file(s) of marked-up miscellaneous record submittals.
   1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839
SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
      1. Demonstration of operation of systems, subsystems, and equipment.
      2. Training in operation and maintenance of systems, subsystems, and equipment.
      3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS
   A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
      1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
   B. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 CLOSEOUT SUBMITTALS
   A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
      1. Identification: On each copy, provide an applied label with the following information:
         a. Name of Project.
         b. Name and address of videographer.
         c. Name of Architect.
         d. Name of Contractor.
         e. Date of video recording.
      2. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals and in PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE
   A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section “Quality Requirements,” experienced in operation and maintenance procedures and training.
B. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.

2. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.

3. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

4. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.

5. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section “Operation and Maintenance Data.”

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Owner will furnish an instructor to describe Owner's operational philosophy.
   2. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner, through Architect, with at least seven days' advance notice.

C. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.
3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
   1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
   1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
   2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
   3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
   4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
      a. Name of Contractor/Installer.
      b. Business address.
      c. Business phone number.
      d. Point of contact.
      e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
   1. Film training session(s) in segments not to exceed 15 minutes.
      a. Produce segments to present a single significant piece of equipment per segment.
      b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
      c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
   1. Furnish additional portable lighting as required.
PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. Provide Indoor Air Quality (IAQ) Management Plan to remain in force during the construction period.

1.3 SUBMITTAL
   A. Construction Indoor Air Quality Management Plan (CIAQM Plan).

PART 2 - OBJECTIVES DURING CONSTRUCTION

2.1 PROTECTION
   A. Store all materials and equipment in a protected area (inside warehouse or storage trailer). Protect materials and equipment that are too large or heavy to store in a trailer from water and dirt/dust/debris.
      1. OPTION: When stored outside, provide two layers of minimum 8-mil poly on the ground and elevate equipment or material a minimum of 4 inches to allow water to run off. Secure top and sides with two layers of 8-mil poly to prevent water penetration and dust/dirt accumulation.
   B. Protect HVAC equipment from dust and odors. Do not store equipment in areas near painting, pressure washing, or excavation. Do not operate equipment during cutting or grinding of masonry or concrete.
      1. Refer to Division 23 for construction filter requirements for protection of mechanical duct systems during construction.
      2. Clean ductwork when installed. Cap ends with poly during construction to prevent contamination.
      3. Do not operate HVAC system until the exterior walls, roof, glass, doors and building filters are properly installed.
      4. If air handlers must be used during construction, provide filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 at each air-handling unit. Provide specified prefilters and final filters for operation during construction or install temporary 4-inch MERV 8 filters at each return air grille for operation during construction.
      5. Replace all filtration media immediately prior to Substantial Completion.
         a. Filtration media installed in air-handling units shall have a Minimum Efficiency Reporting Value (MERV) of 8.
6. Do not perform Testing and Balancing until dust or odor generating activities are completed.

2.2 SOURCE CONTROL
   A. Minimize IAQ contaminants introduced by construction materials.
   B. Store waste construction materials a minimum of 30 feet away from the building.
   C. Do not smoke within 30 feet of the exterior building perimeter.

2.3 PATHWAY INTERRUPTION
   A. Provide barriers to contain construction areas to allow a portion of the building to be cleaned and then operate the HVAC system in that cleaned area. Acceptable barriers include dust curtains and temporary walls.
      1. Protect areas of the building in which HVAC is operational by physical barriers from areas of the building not acceptable for operation of the HVAC system.
   B. Maintain areas within 30 feet of outdoor air intakes free of dust, dirt, debris, and volatile materials while the HVAC system is in operation.

2.4 HOUSEKEEPING
   A. As dust accumulates at the Site, it can become airborne when disturbed by nearby activity. Similarly, spills or excess applications of products containing solvents will increase odors at the Site. Leaving the Site wet or damp for more than a day could result in the growth of mold and bacteria. Therefore, Site cleanup and maintenance is important to maintaining good IAQ during construction.
   B. Perform the following to control contaminants at the Site:
      1. Suppress dust with wetting agents or sweeping compounds
      2. Provide an efficient dust collection method (e.g. a damp rag, wet mop, or vacuum equipped with a high efficiency particulate arrester (HEPA) filter or wet scrubber).
      3. Remove spills or excess applications of solvent-containing products immediately. Provide low-VOC emitting spot removers and cleaning agents near occupied areas.
      4. Remove accumulated water and keep work areas as dry as possible, including the use of dehumidification, if necessary.
      5. Once building is enclosed, vacuum with HEPA filtered vacuum cleaners to prevent settled dust from becoming airborne again.
      6. Protect porous materials from exposure to moisture. Replace items that remain damp for more than four hours.

END OF SECTION 018119
SECTION 024119 – SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
   B. (Remove and) Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
   C. (Remove and) Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
   D. Existing (to Remain): Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.3 PREINSTALLATION MEETINGS
   A. Pre-demolition Conference: Conduct conference at Project site.
      1. Inspect and discuss condition of construction to be selectively demolished.
      2. Review structural load limitations of existing structure.
      3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
      4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
      5. Review areas where existing construction is to remain and requires protection.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For refrigerant recovery technician.
   C. Pre-demolition Digital Photographs or Digital Video-recordings: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit to Owner’s representative as part of the submittal package required prior to release of the first request for payment.
      1. Prior to mobilization, Owner’s representative and Contractor shall together review existing conditions in the construction and mobilization area. The Contractor in the presence of the Owner shall digitally photograph or video-record existing conditions in sufficient detail to record accurately the physical conditions at the start of construction.
      2. The Contractor shall provide and the Owner and Contractor shall retain identical digital copies of the documentation.
      3. At closeout the Owner’s acceptance of the Work includes acceptance of the remaining existing conditions as undamaged by Contractor’s forces.
D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.5 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

1. The Owner and Contractor shall establish “staging areas” for temporary storage of furniture and furnishings removed for alteration areas during construction activities. Work areas should be free of furniture and furnishings during construction activities. The Contractor is responsible for removing furniture from work areas prior to performing work. Contractor is responsible for moving furniture back into place only after the construction activities in that area are complete and area is cleaned. For bidding purposes, approximately 25 tables and chairs plus a teacher’s desk and chair shall be moved from each classroom, offices have desks and chairs to be moved, conference room tables and chairs to be removed, and at the media center all shelving, seating and the circulation desk shall be removed. A pre-bid walk through to quantify actual furnishings to be moved before and after construction activities is highly recommended.

2. Contractor shall be responsible for protecting existing fixed equipment from damage during construction activities including, but not limited to, smart boards, projectors and other fixed equipment.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove loose furniture, furnishings and equipment.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Coordination of Selective Demolition Activities: Coordinate the following with Owner: Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.

2. Interruption of utility services. Indicate how long utility services will be interrupted.

3. Coordination for shutoff, capping, and continuation of utility services.

4. Locations of proposed dust- and noise-control temporary partitions and means of egress.

5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

6. Means of protection for items to remain and items in path of waste removal from building.
A. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
   1. Hazardous material remediation is specified elsewhere in the Contract Documents.
   2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

B. Storage or sale of removed items or materials on-site is not permitted.

C. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION
A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Take measures required by OSHA and governing authorities. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Survey of Existing Conditions: Record existing conditions by use of preconstruction digital photographs or preconstruction digital video recordings.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

SELECTIVE STRUCTURE DEMOLITION 024119 - 3
F. Survey of Existing Conditions: Record existing conditions by use of preconstruction digital photographs or preconstruction digital video recordings.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems which will remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Arrange to shut off utilities with utility companies.
   2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
      a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
      b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
      c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
      d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
      e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
      f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
      g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section “Temporary Facilities and Controls.”

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
   5. Maintain fire watch during and for at least 30 minutes after flame-cutting operations.
   7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Surfaces to Receive Finishes:
   1. Remove miscellaneous hangers, exposed nails not serving as fasteners, and similar protrusions; remove adhesive residue and tape; fill anchorage holes; and otherwise patch and restore surface to be a uniform substrate suitable for applied finishes.
D. Removed and Salvaged Items:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to Owner's storage area designated by Owner.
   5. Protect items from damage during transport and storage.

E. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Pack or crate items after cleaning and repairing. Identify contents of containers.
   3. Protect items from damage during transport and storage.
   4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS
A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
   1. Remove to suit toothing in new masonry at exposed surfaces, new openings, and where indicated.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Floor Finishes: After removal of existing floor finishes including backings, underlayments, and thick-set mortar beds; remove all residual adhesives and glue. Provide grinding, sanding, or shot-blasting of existing concrete floor slab to achieve the proper surface to receive new indicated floor finish. Coordinate slab surface preparations required for each new indicated floor finish with appropriate subcontractor.

F. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's “Recommended Work Practices for the Removal of Resilient Floor Coverings.” Do not use methods requiring solvent-based adhesive strippers.

3.7 DISPOSAL OF DEMOLISHED MATERIALS
A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
   1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119
SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract documents apply to this Section.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with fly ash or ground granulated blast-furnace slag, subject to compliance with requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. 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. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. 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.

D. Slab Protection: Identify proposed slab protection system recommended by concrete polishing professional.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, testing agency.

B. 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. Curing compounds.
   6. Floor and slab treatments.
   8. Adhesives.

C. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. 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.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. 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.

D. 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.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Preinstallation Conference: Conduct conference at Project site.

1. After submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

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

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
F. 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.


G. 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 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed (weldable).
C. Plain-Steel Wire: ASTM A 82, galvanized.

2.3 REINFORCEMENT ACCESSORIES

A. 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 and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I, II or I/II. Supplement with the following:
   a. Fly Ash: ASTM C 618, Class F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94 and potable.

2.5 ADMIXTURES


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

2.6 VAPOR BARRIERS

A. Sheet Vapor Barrier: ASTM E 1745, Class A, with max perm rating of 0.008. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   c. Stego Industries, LLC; Stego Wrap 15 mil.
   d. Viper “Vipercheck II”

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.
2.8 RELATED MATERIALS

A. Construction Joint: Preformed, galvanized steel cold joint with removable polystyrene cap with 3/8”x1/2”.

B. Isolation Joint-Filler Strip: ASTM D 1751, pre-formed asphalt-saturated cellulosic fiber with scored top strip to facilitate installation of sealant. Thickness shall be 1/2” unless otherwise indicated.

C. Expansion Joint Filler Strip: Pre-formed closed cell polyethylene foam with pressure sensitive adhesive with scored top strip to facilitate installation of sealant. Thickness shall be 1/2” unless otherwise indicated.

D. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

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

2.9 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.10 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 20 percent.
2. Ground Granulated Blast-Furnace Slag: 20 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, and concrete with a water-cementitious materials ratio below 0.50.

E. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 6% within a tolerance of plus 1 or minus 1.5 percent, for exposed exterior concrete only, unless otherwise indicated:

F. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 3 percent.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As indicated.
2. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
3. Maximum water/cement ratio: 0.54.
B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As indicated.
2. Slump Limit: 5 inches, plus or minus 1 inch.

C. Suspended Slabs on Steel Deck: Proportion structural light weight concrete mixture as follows:

1. Minimum Compressive Strength: As indicated.
2. Calculated Equilibrium Unit Weight: 110 lb/cu. ft. plus or minus 3 lb/cu.ft. as determined by ASTM C 567.
3. Slump Limit: 5 inches, plus or minus 1 inch.

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide 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.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

2. Class B, 1/4 inch for rough-formed finished surfaces.
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 1.5 horizontal to 1 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. Chamfer exterior corners and edges of permanently exposed concrete.

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. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 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.
3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

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 approved by Architect.

3.4 VAPOR BARRIERS

A. Sheet Vapor Barriers: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

2. Seal to all penetrations and vertical surfaces.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

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.
3.6 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 or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   3. Locate horizontal joints in walls at the top of footings or floor slabs.
   4. Space vertical joints as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.7 CONCRETE PLACEMENT

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

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of 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.
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 darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. 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 deg F 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 approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled 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 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.

3.8 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 Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. 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 a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
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.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

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.

3.9 FINISHING FLOORS AND SLABS

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

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
a. Specified overall values of flatness, \( F(F) \) 50; and of levelness, \( F(L) \) 35; with minimum local values of flatness, \( F(F) \) 35; and of levelness, \( F(L) \) 25; for slabs-on-grade.

b. Specified overall values of flatness, \( F(F) \) 40; with minimum local values of flatness, \( F(F) \) 30; for unshored suspended slabs.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
3.11  CONCRETE 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. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h 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.

C. 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.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. 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-mm) 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 mm), 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.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound.
manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.13 CONCRETE SURFACE REPAIRS

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

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143; one test at point of placement 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.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   a. Cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C 39; test one laboratory-cured specimen at 7 days and one set of two specimens at 28 days. Hold one specimen in reserve for 56 day test.
   a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days,
concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

H. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

I. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION 033000
SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of the Contract and of the Contract Documents apply to this Section.

B. Related Sections:
   1. Division 01 Section “Execution” for procedures for cutting and patching of existing masonry and Division 02 Section “Selective Demolition” for procedures for selective demolition of existing masonry.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PERFORMANCE REQUIREMENTS

Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1. For Concrete Unit Masonry: $f'_{m} = 2000$ psi.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Submit product data for masonry cleaner products recommended by unit masonry manufacturer for proposed unit masonry.

B. Shop Drawings: For the following:
   1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, “Details and Detailing of Concrete Reinforcement.” Show elevations of reinforced walls.

C. Material Certificates: For each type and size of the following:
   1. Masonry units.
      a. Include material test reports substantiating compliance with requirements.
      b. For concrete masonry units, include data verifying compliance with ASTM C 33 for normal weight aggregates, and ASTM C 331 for lightweight aggregates, and ASTM C 618 for fly ash.

2. Cementitious materials. Include brand, type, and name of manufacturer.

3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.

4. Grout mixes. Include description of type and proportions of ingredients.

5. Reinforcing bars.


7. Anchors, ties, and metal accessories.
D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
   2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
C. Aggregate for Concrete Masonry Units: If bottom ash is used as “aggregate” in the CMU, the “Source” for the bottom ash shall be a power station that has a minimum of ten (10) years continuous experience as a supplier of quality material as verified by independent certified laboratory testing and no defects in the marketplace.
D. Source Limitations for Mortar 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.
E. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
D. Deliver pre-blended dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover in a dry location or in a metal dispensing silo with weatherproof cover
E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of Masonry: Cover partially completed masonry when construction is not in progress.
B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units for exposed outside corners unless otherwise indicated. Provide square edge outside corners for all concealed conditions.
3. Provide solid bullnose cap units at top of exposed free-standing walls as indicated on Drawings.

B. CMUs: ASTM C 90.

1. Density Classification: Lightweight unless otherwise indicated.
2. Aggregates:
   a. Waste concrete, scoria, or aglite shall not be permitted.
   a. Width: Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Provide manufacturer’s standard color and texture.

2.3 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C 91.

1. Entrained air content shall not exceed 17 percent of volume.

B. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4-inch-thick, use aggregate graded with 100 percent passing the No. 16 sieve.

C. Aggregate for Grout: ASTM C 404.

D. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

E. Water: Potable.

2.4 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951.
   1. Interior Walls: Mill- galvanized, carbon steel.
   2. Wire Size for Side Rods: 0.148-inch diameter.
   4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
   5. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair side rods.

2.5 MISCELLANEOUS ANCHORS

A. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of dimensions indicated.

B. Post-installed Anchors: Torque-controlled expansion anchors.
   1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
   2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 unless otherwise indicated.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; width and thickness indicated; formulated from closed cell neoprene or urethane.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      b. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
2.7 CAVITY-WALL INSULATION
A. Refer to Division 7 Section “Thermal Insulation” for cavity insulation.

2.8 MASONRY CLEANERS
A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in one (1) gallon of water.
B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Diedrich Technologies, Inc.
      b. EaCo Chem, Inc.
      c. Prosoco, Inc.

2.9 MORTAR AND GROUT MIXES
A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Use masonry cement mortar unless otherwise indicated.
B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
   1. For reinforced masonry and where indicated, use Type S.
   2. For interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
   3. For interior non-load-bearing partitions, Type O may be used instead of Type N.
   4. Comply with requirements for mortar for fire-resistance rated assemblies.
D. Grout for Unit Masonry: Comply with ASTM C 476 and notes on Structural Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Verify that foundations are within tolerances specified.
2. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

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

3.2 INSTALLATION, GENERAL

A. Existing Masonry: Refer to Division 01 Section “Execution” for procedures for cutting and patching of existing masonry and Division 02 Section “Selective Structure Demolition” for procedures for selective demolition of existing masonry.

B. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

C. Build chases and recesses to accommodate items specified in this and other Sections.

D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

E. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. When erecting masonry partitions, chases, and pilasters adjacent to steel columns, keep spaces between columns and masonry free of mortar droppings.

H. Sleeves: Install sleeves in walls to allow for the passage of piping and conduits.

3.3 TOLERANCES

A. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

5. For exposed head joints, do not vary from thickness indicated by more than 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern: Unless otherwise indicated, match existing bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated. Mix mortar (or grout) to a 4-inch maximum slump consistency and hand trowel into place in accordance with Steel Door Institute (SDI-100).

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

H. Grout all hollow masonry and cavities solid below grade except where protected by waterproofing.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section “Fire-Resistive Joint Systems.”

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:
   1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
   2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
   3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
   4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Provide continuity at wall intersections by using prefabricated T-shaped units.

C. Provide continuity at corners by using prefabricated L-shaped units.

3.7 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.8 FIELD QUALITY CONTROL

A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.
   1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.

B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
   1. Payment for these services will be made by Owner.
   2. Retest materials failing to comply with specified requirements at Contractor's expense.

C. Mortar properties will be tested per ASTM C 780. Perform testing for first three days of construction and whenever mortar mix is altered or mixing techniques differ from accepted material test reports.
D. Sample and test grout compressive strength per ASTM C 1019. Perform testing for first three days of construction and whenever grout mix is altered or mixing techniques differ from accepted material test reports.

E. Concrete Masonry Unit Tests: For primary bearing concrete masonry units utilized in project, units will be tested according to ASTM C 140. Primary bearing unit size(s) are 8-inch for project, and additional size units if so required by Architect.

3.9 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
   3. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

END OF SECTION 042000
SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 COORDINATION
   A. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS
   A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage, footers and accessory items.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For professional engineer.
   B. Welding certificates.
   C. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.5 QUALITY ASSURANCE
   A. Welding Qualifications: Qualify procedures and personnel according to the following:

1.6 FIELD CONDITIONS
   A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Structural Performance of Railings: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
      1. Handrails and Top Rails of Guards:
         a. Uniform load of 50 lbf/ft applied in any direction.
         b. Concentrated load of 200 lbf applied in any direction.
         c. Uniform and concentrated loads need not be assumed to act concurrently.
      2. Infill of Guards:
         a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
         b. Infill load and other loads need not be assumed to act concurrently.
B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS
A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
C. Steel Plates, Shapes, and Bars: ASTM A 36.
D. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240 or ASTM A 666, Type 304.
E. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

2.3 FASTENERS
A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
   1. Provide stainless-steel fasteners for fastening aluminum.
   2. Provide stainless-steel fasteners for fastening stainless steel.
B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
   1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
E. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
F. Post-Installed Anchors: Torque-controlled expansion anchors.
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

G. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

B. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Concrete: Comply with requirements in Division 03 Section “Cast-in-Place Concrete” for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 PREFABRICATED MODULAR ALUMINUM RAMP AND STEP SYSTEM


1. All materials shall be constructed of 6000 series aluminum. Primary structural components shall be fabricated of 6061-T6 aluminum alloy.

2. Provide concrete footings on uneven ground or where soft ground would allow excessive settling.

3. Provide slip-resistant, perforated extruded aluminum deck sections.

4. Provide guardrail with pickets meeting IBC and ADA regulations, 42-inches high and spaced to prevent passage of a 4-inch sphere, along full length of walkway and stairs. Provide 34-inch high handrail meeting IBC and ADA regulations at stair location. All railings shall be designed to resist a concentrated load of 200 lbs and a load of 50 lbs/lin ft, applied in any direction, at the top of the rail.


2.7 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
C. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fill all holes, including vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

F. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

G. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of bituminous paint.
   2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions and overhead doors securely to, and rigidly brace from, building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
   1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in “Installing Bearing and Leveling Plates” Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in “Installing Bearing and Leveling Plates” Article.
   1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

END OF SECTION 055000
SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   2. NLGA: National Lumber Grades Authority.
   3. RIS: Redwood Inspection Service.
   5. WCLIB: West Coast Lumber Inspection Bureau.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
   3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
   4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
   5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:
   1. Wood-preservative-treated wood.
   2. Fire-retardant-treated wood.
5. Expansion anchors.
6. Metal framing anchors.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

A. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat items indicated on Drawings, and the following:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
   4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
   5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less and a smoke developed index of 450 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
   1. Use treatment that does not promote corrosion of metal fasteners.
   2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
   3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
   4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
D. FRT Materials: Exposure to precipitation shall be avoided. If treated material does become damp or wet, it shall be replaced or permitted to completely dry prior to being covered by other construction materials.

E. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

F. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

G. Application: Treat items indicated on Drawings, and the following:
   1. Framing for raised platforms.
   2. Concealed blocking.
   3. Framing for non-load-bearing partitions.
   5. Roof construction.
   6. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
   1. Application: Interior partitions not indicated as load-bearing and miscellaneous wood framing.
   2. Species:
      a. Mixed southern pine; SPIB.
      b. Spruce-pine-fir; NLGA.
      c. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

B. Joists, Rafters, and Other Framing Not Listed Above: Construction or No. 2 grade.
   1. Species:
      a. Southern pine; SPIB.
      b. Spruce-pine-fir; NLGA.
      c. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   3. Rooftop equipment bases and support curbs.
   4. Furring.
   5. Utility shelving.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
   1. Hem-fir (north); NLGA.
   2. Mixed southern pine; SPIB.
   3. Spruce-pine-fir; NLGA.
   4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.

C. For utility shelving, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
   1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
   2. Mixed southern pine; No. 2 grade; SPIB.
   3. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
   4. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
   1. Mixed southern pine; No. 3 grade; SPIB.
   2. Hem-fir or hem-fir (north); Standard or No. 3 Common grade; NLGA, WCLIB, or WWPA.
   3. Spruce-pine-fir (south) or spruce-pine-fir; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Install fasteners and anchors in accordance with manufacturer’s written installation instructions.
   1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.

B. Nails, Brads, and Staples: ASTM F 1667.


D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

H. Screws for Fastening Parapet Nailers:
1. For steel framing: #10 SIP low profile flat head screws intended for wood-to-metal connections, at spacing indicated.
2. For masonry backup: 1/4-inch diameter low profile flat head type concrete screw anchors, at spacing indicated. Length to suit embedment into CMU of 1-1/4 inches minimum.
   a. Pullout capacity: 100 lb minimum at 1-inch embedment in face shell of hollow CMU.

2.8 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Cleveland Steel Specialty Co.
   2. KC Metals Products, Inc.
   3. Phoenix Metal Products, Inc.
   4. Simpson Strong-Tie Co., Inc.
   5. USP Structural Connectors.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation.
   1. Use for interior locations unless otherwise indicated.

D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
   1. Use for wood-preservative-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
C. Water-Repellent Preservative: NWWDA-tested and accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, “Details for Conventional Wood Frame Construction,” unless otherwise indicated.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
   1. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.

K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials.
Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
   1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
   2. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

M. Unless indicated otherwise, where wood studs are indicated, provide nominal 2 x 4 wood stud framing at 16 inches on center.

3.2 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
   1. For roofing work, comply with FM Global Loss Prevention Sheet 1-49 and roofing manufacturer’s requirements.

C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
   1. Provide fasteners with hot-dip zinc coating complying with ASTM A 153 to secure wood-preservative-treated lumber at steel deck.

3.3 INSTALLATION OF WOOD NAILERS AT PARAPETS

A. General: Secure wood nailers and plywood to prepared substrate using mechanical fasteners to attain loading design requirements. Adhesive anchorage in lieu of mechanical fasteners for wood nailer anchorage is not acceptable.
   1. Coordinate with installation of [continuous insulation] [and air barrier membrane materials] to top of parapet substrate (preceding trade) and installation of roofing materials and coping assembly (subsequent trades).

B. Installation at CMU Parapets: Secure parapet blocking to CMU with screw anchors in 2 rows at 64 inches on center, staggered, except within 10 feet of building corners provide 2 rows at 48 inches on center. Embedment length into CMU shall be 1-1/4-inch minimum. Install screw heads flush with uppermost surface of blocking or plywood sheathing if any. Install screws in accordance with manufacturer’s instructions.

C. Installation at CFSF-S Framed Parapets: Secure blocking to steel framing with screws in 2 rows at 16 inches on center, except within 10 feet of building corners provide 2 rows at 12 inches on center.
   1. Provide attachment to cold formed steel framing in accordance with APA Form No. T625C, Table 1 for 3/4 inch plywood panel thickness, wall stud spacing, and wind exposure category indicated.
3.4 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.5 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000
SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
   3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
   4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
   5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.3 INFORMATIONAL SUBMITTALS
A. Evaluation Reports: For following products, from ICC-ES:
   1. Preservative-treated plywood.
   2. Fire-retardant-treated plywood.

1.4 QUALITY ASSURANCE
A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Fire-Resistance Ratings: Indicated by design designations from UL’s “Fire Resistance Directory”.

2.2 WOOD PANEL PRODUCTS

A. Emissions: Composite wood and agrifiber products permanently installed inside the weatherproofing system shall contain no added urea formaldehyde resins. Temporary materials and materials considered fixtures, furniture, and equipment are not considered base building elements and are thus excluded from this restriction.

B. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.

C. Oriented Strand Board: DOC PS 2.

D. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

E. Factory mark panels to indicate compliance with applicable standard.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
   1. Fire-retardant-treatment shall not include ammonium phosphates for plywood sheathing.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
   1. Use treatment that does not promote corrosion of metal fasteners.
   2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
   3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
   4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
D. FRT Materials: Exposure to precipitation shall be avoided. If treated material does become damp or wet, it shall be replaced or permitted to completely dry prior to being covered by other construction materials.

E. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

F. Application: Treat plywood indicated on Drawings, and the following:
   1. Roof and wall sheathing within 48 inches of fire walls.
   2. Roof sheathing.
   3. Subflooring and underlayment for raised platforms.

2.4 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior, Exposure 1 sheathing.
   1. Nominal Thickness: As indicated.

   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corporation; GlasRoc.
      b. G-P Gypsum Corporation; Dens-Glass Gold.
      c. National Gypsum Company; Gold Bond e(2)XP.
      d. Temple-Inland Inc.; GreenGlass
      e. United States Gypsum Co.; Securock.
   2. Type and Thickness: Regular, 5/8-inch thick.
      1. Size: 48-inch width by length suitable for installation.

2.5 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior, Exposure 1 sheathing.
   1. Nominal Thickness: As indicated. Not less than 1/2 inch.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

B. Nails, Brads, and Staples: ASTM F 1667.


D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
   1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For (CFSF-NS) steel framing less than 0.0329-inch-thick, use screws that comply with ASTM C 1002.
2. For (CFSF-S) steel framing from 0.033 to 0.112-inch-thick, use screws that comply with ASTM C 954.

2.7 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing Board: Elastomeric, 100% solids, moisture-curing polyether joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated, and complying with requirements for elastomeric sealants specified in Division 7 Section “Joint Sealants.”

1. Provide polyether based, 100% solids, moisture-curing elastomeric sealant.
   a. York “GreatSeal LT-100 Liquid Tape.
   b. BASF Building Systems (former Degussa) “Sonnelastic 150”
   c. STS Coatings “GreatSeal”

B. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

1. Adhesives applied inside the weatherproofing system shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168 volatile organic compound (VOC) limits as required for LEED. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION


B. Fastening Methods: Fasten panels as indicated below:

1. Combination Subfloor-Underlayment:
   a. Screw to cold-formed metal framing.
   b. Space panels 1/8 inch apart at edges and ends.

2. Wall and Roof Sheathing:
   a. Screw to cold-formed metal framing.
   b. Space panels 1/8 inch apart at edges and ends.
   c. Roof Sheathing: Provide “Ply-Clips” of type and spacing as recommended by APA for standard, square edged plywood roof sheathing, where sheathing is anchored directly to trusses and framing members.

C. Provide two-ply fascia board construction indicated, in-plane, level, and with true bottom edge.

1. Fascia cladding is specified in Division 7 Section “Metal Roof Panels.”

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.

2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.

3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

D. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply polyether-based sealant with extended width nozzle for nominal 1-inch wide coverage to glass-mat gypsum sheathing board joints. Apply sealant to exposed fasteners heads with a trowel so fasteners are completely covered. Seal other penetrations and openings.

2. Coordinate with subsequent application of air barrier system.

END OF SECTION 061600
SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's “The NRCA Roofing and Waterproofing Manual” apply to work of this Section.

1.3 PREINSTALLATION MEETINGS
A. Preinstallation Roofing Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review materials certification and procedures.
   3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   4. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   6. Review structural loading limitations of roof deck during and after roofing.
   7. Review installation requirements for the wood blocking, wood curbs, and wood nailers.
   8. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
   9. Review governing regulations and requirements for insurance and certificates if applicable.
  10. Review temporary protection requirements for roofing system during and after installation.
  11. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
   1. Base flashings and membrane terminations.
   2. Tapered insulation, including slopes and preformed shapes (saddles, crickets, tapered edges).
   3. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
4. Include details of roofing vapor retarder/air barrier membrane connection to wall air barrier system to accomplish continuous air barrier system for an airtight building enclosure.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Installation Instructions: Manufacturer’s current printed instructions for installation of materials and systems proposed. Address conditions of projects including concrete deck preparation, required weather and temperature conditions for installation, and all roofing system components.

C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in “Performance Requirements” Article.
   1. Submit evidence of compliance with performance requirements.

D. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

E. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

F. Sample Warranties: For manufacturer's special warranties.

G. Inspection Report: Copies of roofing system manufacturer's inspection report of completed roofing installation, and of field inspection reports for startup and in-progress inspections.

H. Schedule of Values: Membrane roofing Schedule of Values shall include a separate line item for final roof cleaning.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

C. Inspection Reports of Roofing Manufacturer's Representative: Roofing manufacturer's technical representative shall inspect the work and provide copies of his inspection reports to the Architect and the Owner. The Installer shall notify manufacturer's representative of intended start date & schedule of roofing work.
   1. The Installer and Roofing manufacturer's representative shall inspect the substrate surfaces (deck) to receive roofing system prior to beginning installation.
   2. The roofing manufacturer's representative shall inspect the work no less than three times (startup, in-progress, and end-of-installation warranty inspection) during the application of the system and submit copies of inspection reports to the Architect and Owner within 7 days of the inspection.
1.8 DELIVERY, STORAGE, AND HANDLING
A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS
A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY
A. Special Warranty: Manufacturer's standard or customized “edge-to-edge” or “total system” warranty form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
1. Special warranty includes roofing, base flashings, roof insulation, fasteners, edge metals and copings, cover boards, substrate board, vapor retarder/air barrier, roofing accessories, walkway pads and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.
B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarder/air barriers, roof pavers, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Carlisle SynTec Incorporated.
2. Firestone Building Products.

A. Source Limitations: Obtain components including roof insulation, fasteners, pre-manufactured copings and edge metals, and cover and substrate boards for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
   1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
   2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272, CGSB 37-GP-52M, or the “Resistance to Foot Traffic Test” in Section 5.5 of FM 4470.
   3. Static Uplift Testing: In addition to wind uplift requirements, system tested per FM 4474, UL 580 or UL 1897.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7 as established by applicable building code and loading indicated.
   1. Corner Uplift Pressure: Per building code and values indicated on Structural Drawings.
   2. Perimeter Uplift Pressure: Per building code and values indicated on Structural Drawings.
   3. Field-of-Roof Uplift Pressure: Per building code and values indicated on Structural Drawings.

D. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a built-up roofing system, and shall be listed in FM Global's “RoofNav” for Class I or noncombustible construction, as applicable. Identify materials with FM Global markings.
   1. Fire/Windstorm Classification: Class 1A-90.
   2. Hail-Resistance Rating: MH.

E. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING

   1. Thickness: 60 mils, nominal; 15 mils min polyolefin thickness above reinforcing.
2. Exposed Face Color: White.
4. Physical Properties:
   b. Elongation at Break: 15 percent; ASTM D 751.
   c. Tearing Strength: 92 lbf; ASTM D 751, Procedure B.
   d. Puncture Resistance: 300 lbs. typical, FTM 101C (Method 2031)
   e. Brittleness Point: Minus 40 deg F.
   f. Ozone Resistance: No cracks after sample, wrapped around a 3-inch- diameter mandrel, is exposed for 166 hours to a temperature of 104 deg F and an ozone level of 100 pphm; ASTM D 1149.
   g. Resistance to Heat Aging: 90 percent minimum retention of breaking strength and elongation at break, and 60 percent minimum tearing strength after 5,376 hours at 240 deg F; ASTM D 573.
   h. Water Absorption: Less than 3 percent mass change after 166 hours' immersion at 158 deg F; ASTM D 471.
   i. Linear Dimension Change: Plus or minus 1 percent; ASTM D 1204.

2.4 AUXILIARY ROOFING MATERIALS
   A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
      1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
   B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.
   C. Bonding Adhesive: Manufacturer's standard.
   D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8-inch-thick; with anchors.
   E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
   F. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 SUBSTRATE BOARDS
   A. Substrate Board: ASTM C 1177, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.
      1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
         a. CertainTeed Corporation; GlasRoc Sheathing.
         b. Georgia-Pacific Corporation; Dens Deck.
         c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
d. Temple-Inland, Inc; GreenGlass Exterior Sheathing.
e. USG Corporation; Securock Glass Mat Roof Board.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.

2.6 VAPOR RETARDER/AIR BARRIER

A. Self-Adhering, Vapor Retarder/Underlayment Sheet: Slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thickness: 30 mils minimum.
2. Air leakage: Less than 0.004 CFM/sq ft @1.6 lbs/sq ft (75 Pa.) per ASTM E2178.
3. Vapor Permeance: 0.05 perms maximum per ASTM E96.
5. Elongation: 200% per ASTM D412-modified.
7. Adhesion: 3.0 lbs/in. width (525 N/m) minimum per ASTM D903 for plywood.
8. Available Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Carlisle SynTec; “VapAir Seal 725 TR.”
   b. Firestone; “V-Force Vapor Barrier.”
   c. Johns Manville; “JM Vapor Barrier SA.”

2.7 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

1. Provide treated wood blocking, specified in Division 6 Section “Rough Carpentry,” as required for roofing system manufacturer’s approved installation details. Provide blocking required by roofing system manufacturer in excess of blocking indicated on Drawings at no additional cost to Owner.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
   1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
   2. Full-spread spray-applied, low-rise, two-component urethane adhesive.

D. Cover Board: Provide one of the following, subject to compliance with terms of warranty.
   1. ASTM C 1289, Type II, Class I, exceeding Grade 3, high density, closed-cell, polyisocyanurate foam core with coated glass-fiber mat facer on both major surfaces, with maximum 3% water absorption by weight per ASTM C473; mold-resistant per ASTM D3273, minimum 100 psi compressive strength per ASTM D 1621, 1/4- or 1/2-inch-thick as standard with manufacturer. Provide multiple layers as required to achieve an overall thickness of 1/2-inch.
      a. Firestone “Isogard HD Cover Board.”
      b. Johns Manville “Invinsa.”
      c. Carlisle “SecurShield HD.”

E. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

2.9 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
   1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
   3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 “Steel Decking.”

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Install insulation strips according to acoustical roof deck manufacturer's written instructions.
3.3 ROOFING INSTALLATION, GENERAL
   A. Install roofing system according to roofing system manufacturer's written instructions.
   B. Complete terminations and base flashings and provide 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. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.4 SUBSTRATE BOARD INSTALLATION
   A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
      1. Fasten substrate board to top flanges of steel deck according to recommendations in FM Global’s “RoofNav” and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification. Fasteners shall not penetrate bottom flanges of steel roof deck.
         a. Remove fasteners which penetrate bottom flanges of exposed acoustical roof deck and replace with properly located fasteners as required. Restore exposed acoustical roof deck to Owner’s satisfaction.

3.5 VAPOR-RETARDER/AIR BARRIER INSTALLATION
   A. Self-Adhering-Sheet Vapor Retarder/Air Barrier: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder/air barrier, side and end lapping each sheet a minimum of 3-1/2 inches and 6 inches, respectively. Seal laps by rolling.
      1. Coordinate placement of vapor retarder/air barrier underlayment over substrate board on metal roof deck with other components of the building envelope to accomplish the air-tightness of the building enclosure which constitutes the total air barrier system specified in Division 1 Section “Exterior Enclosure Air Barrier Requirements.”
   B. Completely seal vapor retarder/air barrier at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSULATION INSTALLATION
   A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
   B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
   C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
      1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
      2. Install tapered insulation under area of roofing to conform to slopes indicated.
D. Install two layers of polyisocyanurate insulation under area of roofing, for a total thickness of 4 inches, to achieve a cumulative Long Term Thermal Resistance (LTTR) value of 22.8 per ASTM C1289-13, followed by a cover board. Install the two layers of insulation and cover board with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
   1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

G. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners or insulation manufacturer's recommended adhesive, specifically designed and sized for fastening specified board-type roof insulation to deck type, as indicated below.
   1. Mechanically fasten first layer of insulation to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions. Fasteners shall not penetrate bottom flanges of steel roof deck.
      a. Remove fasteners which penetrate bottom flanges of exposed acoustical roof deck and replace with properly located fasteners as required. Restore exposed acoustical roof deck to Owner's satisfaction.
   2. Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place. Provide insulation at 4-, 6-, or 12-inch on center bead spacing required for project to resist uplift pressure calculated according to ASCE/SEI 7 as established by SCBC and loading indicated.

H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and secure to roofing assembly in a uniform coverage of full-spread insulation adhesive or in ribbons of bead-applied insulation adhesive.

3.7 ADHERED ROOFING MEMBRANE INSTALLATION
A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's “Thermoplastic Roof Assembly Design Guidelines.”
   1. Install roofing system TP-I-A-S, according to roof assembly identification matrix and roof assembly layout illustrations in NRCA's “The NRCA Roofing and Waterproofing Manual” and to requirements in this Section.

B. Install roofing membrane over area to receive roofing per TPO roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

C. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.

D. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
E. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and in accordance with manufacturer’s written installation instructions. Do not apply bonding adhesive to splice area of roofing membrane.

F. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

G. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

H. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
   2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
   3. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

I. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

3.8 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.9 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.10 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger the quality or cleanliness of roofing, inspect roofing for deterioration, damage, and cleanliness, describing its nature and extent in a written report that includes representative photographs, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage, deterioration, and dirt/clay at time of Substantial Completion and according to warranty requirements.
C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

D. Conduct final cleaning of the entire roof membrane prior to Substantial Completion to restore roof reflectance to manufacturer’s published value.

3.11 ROOFING INSTALLER’S WARRANTY

A. WHEREAS _______________________________ of ___________________________, herein called the “Roofing Installer,” has performed roofing and associated work (“work”) on the following project:
   1. Owner: <Insert name of Owner>.
   2. Address: <Insert address>.
   3. Building Name/Type: <Insert information>.
   4. Address: <Insert address>.
   5. Area of Work: <Insert information>.
   6. Acceptance Date: _________________.
   7. Warranty Period: <Insert time>.
   8. Expiration Date: __________________.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:
   1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
      a. lightning;
      b. peak gust wind speed exceeding 55 mph;
      c. fire;
      d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
      e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
      f. vapor condensation on bottom of roofing; and
      g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
   2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this __________ day of ______________, ________________.

1. Authorized Signature: _______________________________________.

2. Name: ______________________________________.

3. Title: _______________________________________.

END OF SECTION 075423
SECTION 076201 - FLASHING, SHEET METAL AND ROOFING ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 PERFORMANCE REQUIREMENTS
   A. Manufacture and install copings and roof edge flashings tested according to ANSI/SPRI/FM 4435/ES-1 and capable of resisting the design pressures indicated on Drawings. Provide manufactured pre-engineered roof edge systems; brake metal assemblies fabricated in accordance with NRCA are not acceptable in lieu of manufactured pre-engineered roof edge systems specified.
   1. Roof Edge Fascia System: Conform to ANSI/SPRI/FM 4435/ES-1 Test Method RE-1 for roof edge termination to secure the membrane to a minimum of 100 lb/ft. Conform to ANSI/SPRI/FM 4435/ES-1 Test Method RE-2 pull-off test for fascia to meet design pressure requirement.

1.3 SUBMITTALS
   A. Product data: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.
      1. Submit confirmation that roof edge systems conform to ANSI/SPRI/FM 4435/ES-1 performance requirements.
   B. Samples of specified fluorocarbon ("Kynar") factory finishes on substrate material for coping and gravel stop items. Provide samples of minimum 2-inch square size of full range of manufacturer's standard colors for selection.
   C. Shop drawings showing layout, profiles, methods of joining, and anchorage details, including major counterflashings, gutters and down spouts (coordinated with shingle roofing), conductor heads, copings, trim/fascia units and expansion joint systems. Note metal materials and gage. Identify work by others; Contractor is responsible for coordinating provision of all components included in accepted shop drawings. Provide layouts at 1:48 scale and details at 1:4 scale.
      1. Provide shop drawings of special details, including steps in roof expansion joint systems, and changes in coping width at increase in wall thickness.
      2. Provide shop drawings of fabricated equipment supports. Include certified load bearing data, dimensions, and internal thermal insulation.

1.4 QUALITY ASSURANCE
   A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
1.5  PROJECT CONDITIONS
   A.  Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1  METALS
   A.  Copper: ASTM B 370; temper H00, cold rolled except where temper 060 is required for forming; not less than 16 oz./sq. ft., unless otherwise indicated.
   B.  Aluminum: 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 of alloy and temper designated below:
      1.  Factory-Painted Aluminum Sheet: ASTM B 209, 3003-H14, with a minimum thickness of 0.040 inch, unless otherwise indicated.
      2.  Extruded Aluminum: ASTM B 221, alloy 6063-T52, with a minimum thickness of 0.080 inch for primary legs of extrusions that are anodized, unless otherwise indicated.
   C.  Stainless-Steel Sheet: ASTM A 167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch thick, unless otherwise indicated.
   D.  Galvanized Steel Sheet: ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.

2.2  MISCELLANEOUS MATERIALS AND ACCESSORIES
   A.  Solder: ASTM B 32, Grade Sn50, used with rosin flux.
      1.  Solder for Stainless Steel: ASTM B 32, Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a non-corrosive rosin flux over tinned surfaces.
   B.  Fasteners: Same metal as flashing/sheet metal or, other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
   C.  Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.
   D.  Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section “Joint Sealants.”
   E.  Epoxy Seam Sealer: 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.
   F.  Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gage required for performance.
   G.  Downspout Strainers: 20-gage bronze, copper, or nonmagnetic stainless-steel mesh fabricated units, with selvaged edges and non-corrosive fasteners compatible with gutters and downspouts.

FLASHING, SHEET METAL AND ROOFING ACCESSORIES  076201 - 2
E. Splash Blocks: Provide standard precast concrete splash blocks, 3000 psi precast concrete dish-profile units manufactured for purpose. Light weight “patio blocks” are not acceptable. Note: Provide for all roof storm water outfall conditions, condensation lines, and fire suppression system - both Division 7 and Division 23 applications unless noted otherwise.

2.3 FABRICATED UNITS

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA “Architectural Sheet Metal Manual” (2012-7th edition) and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded into hems.

1. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

2. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of interlocking hooked flanges, minimum 1-inch deep, filled with mastic sealant (concealed in joints).

3. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, to meet SMACNA standards.

4. Separations: Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation recommended by fabricator.

B. Scuppers: Fabricate through-wall scupper as indicated, associated with conductor heads & down conductors. Incorporate gravel stop as indicated. Fabricate of 16 oz. copper.

2.4 REGLETS AND COUNTERFLASHINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Castle Metal Products.
2. Cheney Flashing Company.
3. Fry Reglet Corporation.
4. Heckmann Building Products Inc.
5. OMG EdgeSystems (Formerly W.P. Hickman Company)
7. Metal-Era, Inc.
8. Metal-Fab Manufacturing, LLC.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counter flashing pieces, from the following exposed metal:

1. Copper: 16 oz./sq. ft.
2. Formed Aluminum: 0.024 inch thick.
3. Stainless Steel: 0.025 inch thick.
4. Corners: Factory mitered and soldered (copper) or continuously welded (aluminum).
5. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
6. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
7. Multiuse Type, Embedded: For multiuse embedment in masonry mortar joints.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
1. Copper: 16 oz./sq. ft. Provide for applications at membrane roofs unless noted otherwise.
2. Formed Aluminum-Zinc Alloy-Coated (“Galvalume”) Steel Sheet: 0.028-inch nominal thickness, fluoropolymer coil-coated to match metal roofing panels. Provide for applications at metal roofing unless noted otherwise.
3. Formed Aluminum: 0.032 inch thick. Provide for applications at membrane roofs unless noted otherwise.
4. Stainless Steel: 0.025 inch thick.

D. Accessories:
1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

E. One-Piece Counterflashing (Surface-Applied): Provide one-piece counterflashing of formed metal. Form counter-flashing piece with a back-bend top flange/sealant channel, hemmed drip edge and continuous bend to maintain “spring” pressure against base flashing when in place. Metal profile is shown on drawings. Provide silicone elastomeric sealant as specified in Division 7 Section “Joint Sealants.”
1. Copper: 16 oz./sq. ft. Provide for applications at membrane roofs unless noted otherwise.
2. Formed Aluminum-Zinc Alloy-Coated (“Galvalume”) Steel Sheet: 0.028-inch nominal thickness, fluoropolymer coil-coated to match metal roofing panels. Provide for applications at metal roofing unless noted otherwise.
3. Formed Aluminum: 0.032-inch-thick, fluoropolymer coated to match prefinished aluminum canopy roof, coping or similar conditions.
4. Counterflashing shall be installed with associated roofing work.

F. Copper Finish: Non-patinated, mill.

G. Zinc-Coated Steel Finish: Two-coat fluoropolymer.
1. Color: As selected by Architect from manufacturer's full range.

2.5 ELASTIC EXPANSION JOINTS
A. General: Provide factory-fabricated units of size and profile indicated, complete with prefabricated corner units, intersection units and splicing materials. Provide complete with elastic sheet flashing forming the primary joint membrane, in a supported, “bellows” arrangement designed for attachment to both sides of expansion joints. Insulate underside of bellows with adhesive applied, flexible, closed-cell rubber or plastic not less than 9 mm thick. Provide complete expansion joint system for length of joint, including corners, offsets, steps, and closure pieces.

1. Curb Flange Type: Metal flanged edges, ±50 mm wide, formed to profiles as indicated to fit curbs, and designed for nailing to curb substrate. Provide 16 oz./sq. ft. copper metal flanges.

2. Flat-to-Curb Type: Metal flanged edges, 4-inch flat flange at wall, custom width flange formed to profiles as indicated to fit roof curb & designed for nailing to curb substrate. Provide 16 oz. copper metal flanges.

3. Flat Flange Type: Plain sheet or encapsulated metal flanged edges, for embedment in other construction or nailing to substrates, standard 4-inch minimum flange width.

4. Moisture Barrier: Manufacturer's standard, flexible, continuous, polymeric moisture barrier looped under roof expansion assembly covers at locations indicated. Fill space with blanket-type, mineral-wool insulation.

5. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   a. Afco Products, Inc.
   b. Manville/Roofing Systems Division.
   c. Phoenix Building Products
   d. York Manufacturing, Inc.

2.6 SHEET ALUMINUM FASCIA SYSTEMS AND COPINGS:

A. Fascia for Single-Ply Roofing: Manufactured pre-engineered system consisting of formed 0.040 inch aluminum fascia, and minimum 24-gauge zinc-coated sheet steel water dam; of profile and height indicated; with prefabricated accessories including concealed splice plates, inside and outside corners and special fasteners. Provide prefabricated outside and inside corner, miters welded before finishing. Provide roof edge system tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-1 for roof edge termination to secure the membrane to a minimum of 100 psf and tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-2 pull-off test for fascia to meet design pressure requirement.

1. Nominal fascia height of 6.0-inches.

3. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
   a. “SecurEdge 200/300 Fascia System”; Carlisle Syntec, Inc.
   b. “EdgeGard + Fascia”; Firestone Building Products.
B. Interlocking Multi-Part Coping System: Manufactured pre-engineered coping system (roofer-fabricated copings not acceptable) consisting of formed 0.050 inch aluminum coping of profile indicated, minimum 20-gauge zinc-coated steel anchor plates, and concealed splice plates. Provide prefabricated inside and outside corners, miters welded before finishing; without exposed fasteners. Provide roof edge system tested in accordance with ANSI/SPRI/FM 4435/ES-1 Test Method RE-3 pull-off test for coping to meet design pressure requirement.

1. Provide coping chair formed with support at mid-width of coping for coping width greater than 16-inches.
2. Provide custom perforated metal vent component of coping system indicated. Coordinate continuous perforated vent with coping anchors at manufacturer’s recommended spacing to maintain ventilation path.
3. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
   b. “Perma-Tite”; Metal-Era (Basis of Design)

C. Provide manufactured formed fascia & manufactured coping assemblies from same manufacturer with same finish.

D. Fluoropolymer Coating: Provide a high-performance fluorocarbon coating conforming AAMA 2605 consisting of a minimum 70% fluoropolymer resin coating in a DFT of 0.9 mil minimum, 30% reflective gloss (ASTM D 523), over 0.15 mil minimum baked-on epoxy primer.

1. Durability: Provide coating which has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish; and without chalking in excess of 8 (ASTM D 659), and fading in excess of 5 NBS units for vertical surfaces. (Values are reduced for exposures at an angle from the vertical position.)
2. Provide colors selected by Architect from manufacturer’s standards or published standard 2-coat, non-metallic colors of PPG “Duranar” or Valspar “Fluropon.” One color is required for project.
3. Provide “Kynar ADS” (air cured fluoropolymer resin coating) coating material to match “Kynar 500” coating for field touch-up use.

E. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested per ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA (2003- 6th edition) “Architectural Sheet Metal Manual.” Anchor units of work securely in place by methods indicated, providing for thermal expansion of
metal units; conceal fasteners where possible, and set units true to line and level as indicated.
Install work with laps, joints and seams which will be permanently watertight and weatherproof.

B. Bed flanges of work in accordance with membrane roofing manufacturer's recommendations as
required for waterproof performance.

C. Reglet/Counterflashing Applications: Install receiver/reglet pieces to receive counterflashing.
Where shown in masonry, furnish reglets to mason, for installation as work of Section 042000.

1. Built-in: Insert preformed counterflashing piece in installed receiver/reglet and secured by
snap-in seal arrangement, so that bottom of flashing makes permanent spring clamping
contact with base flashing. Following field bend of receiver cap, place continuous backer
rod and elastomeric sealant in masonry joint above reglet/receiver.

2. Install counterflashing in reglets, either by snap-in seal arrangement, or by welding in place
for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and
depending on degree of sealant exposure.

3. Existing Brick: Saw cut joint in brick joints to uniform 3/4-inch depth for step flashing
pattern indicated. Insert preformed metal receiver/reglet piece to full depth of saw cut and
secure it with lead wedges at 12-inches o.c. Place continuous backer rod and elastomeric
sealant in cut joint reglet. Insert the separate counterflashing piece into reglet so that
bottom of flashing makes permanent spring clamping contact with base flashing.

4. Surface Applied: Install surface applied reglets to receive counterflashing in manner and
by methods indicated. Install counterflashing in reglets by snap-in continuous field bend
of receiver cap seal arrangement: fill reglet with mastic or elastomeric sealant, as indicated.

D. Surface-Applied One-Piece Counterflashing: Install surface applied counterflashing in manner &
by methods indicated. Install counterflashing securely to substrate with neoprene foam tape if
required and batten bar if required (not anticipated for 16 oz./sq. ft. copper), and fill reglet with
mastic or elastomeric sealant, as indicated.

E. One-Piece Counterflashing in Saw-cut Joint: Saw cut reglet joint in brick joints to uniform 3/4-
inch depth for step flashing pattern indicated. Insert preformed counter flashing to full depth of
saw cut and secure with lead wedges at 12-inches o.c., so that bottom of flashing makes permanent
spring clamping contact with base flashing. Place continuous backer rod and elastomeric sealant
in cut joint reglet.

F. Scuppers: Install fabricated scupper in accordance with membrane roofing manufacturer's detail.
Refer to Division 7 Section “PVC Roofing.”

1. Provide appropriate barrier material between copper scupper fabrications and prefinished
aluminum conductor head fabrications.

G. Roof Expansion Joint Installation

1. General: Comply with manufacturer's written instructions for handling and installing roof
expansion joints.

   a. Anchor roof expansion joints securely in place, with provisions for required
      movement. Use fasteners, protective coatings, sealants, and miscellaneous items as
      required for complete roof expansion joint assembly.

   b. Install roof expansion joints true to line and elevation; with limited oil-canning and
      without warping, jogs in alignment, buckling, or tool marks.

   c. Provide for linear thermal expansion of roof expansion joint materials.

   d. Provide uniform profile of roof expansion joint throughout its length; do not stretch
      or squeeze membranes.
e. Provide uniform, neat seams.
   f. Install roof expansion joints to fit substrates and to result in watertight performance.
   g. Torch cutting of roof expansion joints is not permitted.
   h. Do not use graphite pencils to mark aluminum surfaces.

2. Directional Changes and Other Expansion-Control Joint Systems: Coordinate installation of roof expansion joints with other expansion-control joint systems to result in watertight performance. Install factory-fabricated units at directional changes and at transitions between roof expansion joints and exterior expansion-control joint systems specified in Division 07 to provide continuous, uninterrupted, and watertight joints.

3. Splices: Splice roof expansion joints with materials provided by roof-expansion-joint manufacturer for this purpose, to provide continuous, uninterrupted, and waterproof joints.
   a. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.

4. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

H. Copings: Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners. Anchor copings to meet performance requirements.
   1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates. Anchor to substrate at manufacturer's required spacing to meet performance requirements.
      a. Coping Width Less Than 16 Inches: For standard 10 foot length coping sections, anchor at standard 40-inch centers. For standard 12 foot length coping sections, anchor at standard 48-inch centers.
      b. Coping Width 16 Inches or Greater: For standard 10 foot length coping sections, anchor at 30-inch centers. For standard 12 foot length coping sections, anchor at standard 36-inch centers.

   2. Provide custom perforated metal vent component as indicated.

I. Roof Edge Flashing (Fascia/Gravelstop): Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.2 CLEANING AND PROTECTION
   A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
   B. Protection: Protect flashing and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering at time of Substantial Completion.

END OF SECTION 076201
SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. This Section includes joint sealants for the following applications, including those specified in other sections by reference to this Section:
   1. Exterior joints in the following vertical surfaces and horizontal non-traffic surfaces:
      b. Control and expansion joints in unit masonry, including replacing existing joints.
      c. Joints between different materials listed above.
      d. Perimeter joints between door, window, and louver frames and wall materials.
      e. Control and expansion joints in ceilings and other overhead surfaces.
      f. Other joints as indicated.
   2. Exterior joints in the following horizontal traffic surfaces:
      a. Isolation and contraction joints in cast-in-place concrete slabs.
      b. Joints between different materials listed above.
      c. Other joints as indicated.
   3. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Perimeter joints of exterior openings where indicated.
      c. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.
      d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
      e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      f. Joints between dissimilar materials unless detailed otherwise.
      g. Through-penetration joints in non-rated assemblies.
      h. Joints at wall terminations at decks, caps, or obstructions.
      i. Other joints as indicated.
   4. Interior joints in the following horizontal traffic surfaces:
      b. Other joints as indicated.

1.3 PERFORMANCE REQUIREMENTS
A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.
C. Provide joint sealants for interior STC-rated acoustical applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates, while maintaining indicated partition STC rating.
1.4 SUBMITTALS
A. Product Data: For each joint-sealant product indicated.
B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
E. Qualification Data: For Installer and testing agency.
F. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in “Quality Assurance” Article.
G. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
H. Field Test Report Log: For each elastomeric sealant application.
I. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
J. Warranties: Special warranties specified in this Section.
K. Joint-Sealant Schedule: Include the following information:
   1. Specification Section.
   2. Joint-sealant joint location.
   5. Joint-sealant product name.
   7. Joint-sealant primer, when required.
   8. Joint-sealant backer rod type, when required.
   10. Installer.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

2. Submit minimum of eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.

3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

D. Product Testing: Obtain test results for “Product Test Reports” Paragraph in “Submittals” Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.

2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

E. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.

2. Conduct field tests for each application indicated below:
   a. Each type of elastomeric sealant and joint substrate indicated.
   b. Each type of non-elastomeric sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected. Architect's presence at testing is not required.

4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
      1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Provide written report whether sealant in each type of joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
F. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
   1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period - Silicone: 20 years from date of Substantial Completion.
   2. Warranty Period - Urethane: 5 years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
   1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or other outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.
2.2 MATERIALS, GENERAL
   A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
   B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS
   A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
   B. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
   C. Low-Modulus Single-Component Neutral-Curing Silicone Sealant ES-1:
      1. Products:
         a. BASF; MasterSeal NP 100.
         b. GE Silicones; SilPruf SCS2000.
         c. Pecora Corporation; 890NST/890FTS (field-tint)
         e. Tremco; Spectrem 3. (or Spectrem 4TS for field-tint)
      2. Type and Grade: S (single component) and NS (nonsag).
      3. Class: 50.
      4. Use Related to Exposure: NT (nontraffic).
      5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrate, O.
         a. Use O Joint Substrates: fluoropolymer finished aluminum, galvanized steel, brick.
   D. Medium-Modulus Single-Component Neutral-Curing Silicone Sealant ES-2:
      1. Products:
         a. Dow Corning Corporation; 795
         b. GE Silicones; SilPruf NB SCS9000.
         c. Pecora Corporation; 895.
         d. Tremco; Spectrem 2
      2. Type and Grade: S (single component) and NS (nonsag).
      3. Class: 50.
      4. Use Related to Exposure: NT (nontraffic).
      5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrate, O.
   E. Single-Component Mildew-Resistant Silicone Sealant ES-3:
      1. Neutral-Curing Products:
         a. Pecora Corporation; 898.
         b. Tremco; Tremsil 600 White.
2. Acid-Curing Products:
   a. Dow Corning Corporation; 786 Mildew Resistant.
   b. GE Silicones; Sanitary SCS1700.
   c. Tremco; Tremsil 200 [White].
3. Type and Grade: S (single component) and NS (nonsag).
5. Use Related to Exposure: NT (nontraffic).
6. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
   a. Use O Joint Substrates: Galvanized steel and ceramic tile.

F. Non-Traffic Multicomponent Nonsag Urethane Sealant ES-4:
1. Products:
   a. BASF; MasterSeal NP2.
   b. Pecora Corporation; Dynatrol II.
   c. Tremco; Dymeric 240 FC.
   e. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
   f. Tremco; Vulkem 227.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25 minimum.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrate, O.

G. Multicomponent Pourable Urethane Sealant ES-5:
1. Products:
   b. Meadows, W. R., Inc.; POURTHANE.
   c. Pacific Polymers, Inc.; Elasto-Thane 227 Type I (Self Leveling).
   d. Polymeric Systems Inc.; PSI-270SL.
   e. Schnee-Morehead, Inc.; Permathane SM 7201.
   f. Tremco; THC-901 or THC-900. (to suit slope)
2. Type and Grade: M (multicomponent) and P (pourable).
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrate, O.

2.4 SOLVENT-RELEASE JOINT SEALANTS
A. Butyl-Rubber-Based Joint Sealant SRS-1: ASTM C 1311.
   b. Pecora Corporation; BC-158.
   c. Tremco Incorporated; Tremco Butyl Sealant.

2.5 LATEX JOINT SEALANTS
A. Latex Sealant LS-1: Comply with ASTM C 834, Type OP, Grade NF.
1. BASF; MasterSeal NP 520.
2. Bostik Findley; Chem-Calk 600.
5. Tremco; Tremflex 834.

2.6 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant AS-1: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Accumetric LLC; BOSS 826 Acoustical Sound Sealant.
   b. BASF; MasterSeal NP 520.
   c. GE Construction Sealants; RCS20 Acoustical.
   d. Grabber Construction Products; Acoustical Sealant GSC.
   e. Hilti CP506 Smoke and Acoustical Sealant.
   f. Pecora Corporation; AC-20 FTR or AIS-919.
   g. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.

2.7 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bi-cellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with
      requirements for joint configuration, installation tolerances, and other conditions affecting joint-
      sealant performance.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Existing Exterior Masonry Movement Joint Material Replacement: Cut out existing sealant
      control and expansion joint material at exterior masonry; prepare joint substrate surfaces and
      provide new sealant joints as specified herein.
   B. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to
      comply with joint-sealant manufacturer's written instructions and the following requirements:
      1. Remove all foreign material from joint substrates that could interfere with adhesion of
         joint sealant, including dust, paints (except for permanent, protective coatings tested and
         approved for sealant adhesion and compatibility by sealant manufacturer), old joint
         sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
      2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical
         abrading, or a combination of these methods to produce a clean, sound substrate capable
         of developing optimum bond with joint sealants. Remove loose particles remaining after
         cleaning operations above by vacuuming or blowing out joints with oil-free compressed
         air. Porous joint substrates include the following:
         a. Concrete.
         b. Masonry.
         c. Unglazed surfaces of ceramic tile. (work of Division 9 Section “Tiling.”)
         d. Acoustical sealant at gypsum board partitions. (work of Division 9)
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm
      substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous
      joint substrates include the following:
      a. Metal.
      b. Glass. (work of Division 8 Section “Glazing.”)
      c. Porcelain enamel.
      d. Glazed surfaces of ceramic tile. (work of Division 9 Section “Tiling.”)
      e. Acoustical sealant at perimeter metal edge moldings of acoustical panel ceilings.
         (work of Division 9 “Acoustical Panel Ceilings”)
   C. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant
      manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply
      primer to comply with joint-sealant manufacturer's written instructions. Confine primers to
      areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
   D. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining
      surfaces that otherwise would be permanently stained or damaged by such contact or by
      cleaning methods required to remove sealant smears. Remove tape immediately after tooling
      without disturbing joint seal.
3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
1. Provide sealant for all joints where sealant is not specified in other Sections. Seal all joints between dissimilar materials, unless indicated otherwise.
2. For interior partitions indicated to be full height, seal all penetrations and joints unless indicated otherwise.
3. For STC-rated partitions, provide sealant on both sides of partition.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

H. Joint-Sealant Application: Vertical and perimeter joints on concealed surfaces of interior unit masonry, concrete, and panel full-height walls and partitions. Refer to other Division 9 Sections for acoustical sealant included as part of assembly installations.
I. Joint-Sealant Application: Vertical and perimeter joints on exposed and concealed surfaces of interior unit masonry, concrete, and panel acoustic STC-rated walls and partitions. Refer to other Division 9 Sections for acoustical sealant included as part of assembly installations.

3.4 FIELD QUALITY CONTROL
   A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
      1. Extent of Testing: Test completed elastomeric sealant joints as follows:
         a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
         b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
      2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193, as appropriate for type of joint-sealant application indicated.
         a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
      3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
      4. Inspect tested joints and report on the following:
         a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
         b. Whether sealants filled joint cavities and are free of voids.
         c. Whether sealant dimensions and configurations meet specified requirements.
      5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
      6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original substrate.

   B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING
   A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE (Type M = multi-component, Type S = single-component)

   2. Joint-Sealant Color: Standard or custom (factory or field-tint) selected by Architect.

   1. Joint Sealant: Type M pourable urethane sealant ES-5.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

C. Joint-Sealant Application: Exterior vertical control and expansion joints in unit masonry.
   2. Joint-Sealant Color: Standard or custom (factory or field-tint) selected by Architect.

D. Joint-Sealant Application: Exterior vertical joints between different materials listed above.
   2. Joint-Sealant Color: Standard or custom (factory or field-tint) selected by Architect.

E. Joint-Sealant Application: Exterior perimeter joints between walls and frames of doors, windows, and louvers.
   1. Joint Sealant: Low or Medium Modulus Type S neutral-curing silicone sealant ES-1 or ES-2.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

F. Joint-Sealant Application: Vertical control and expansion joints on exposed interior surfaces of exterior walls.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

G. Joint-Sealant Application: Interior perimeter joints of exterior openings.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

H. Joint-Sealant Application: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
   1. Joint Sealant: Type S mildew-resistant neutral or acid-curing silicone sealant ES-3.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

I. Joint-Sealant Application: Vertical joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
J. Joint-Sealant Application: Acoustical joints on concealed surfaces of interior unit masonry, concrete, and panel full-height walls and partitions.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

K. Joint-Sealant Application: Acoustical joints on exposed and concealed surfaces of interior unit masonry, concrete, and panel acoustic STC-rated walls and partitions.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

L. Joint-Sealant Application: Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

M. Joint-Sealant Application: Interior control, expansion, and isolation joints in horizontal traffic surfaces of concrete slab flooring.
   1. Joint Sealant: Type M pourable urethane sealant ES-5.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

N. Joint-Sealant Application: Bedding joint applications.
   1. Joint Sealant: Butyl-Rubber-Based Solvent-Release Joint Sealant SRS-1
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 079200
SECTION 081113 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Minimum Thickness: Minimum thickness of base metal without coatings according to SDI A250.8.
   B. Standard Steel Door and Frame Work: Steel door and frame work fabricated according to ANSI/SDI A250.8.
   C. Undercut: Clearance between bottom of door and top of finish floor or threshold below the door.

1.3 COORDINATION
   A. Coordinate anchorage installation for steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
   B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include construction details, material descriptions, core descriptions, and finishes.

1.5 INFORMATIONAL SUBMITTALS
   A. Product Test Reports: For each type of steel door and frame assembly, for tests performed by a qualified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Deliver steel doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
   B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
   C. Store steel doors and frames vertically under cover at Project site with heads up. Place in stacks of five units maximum, spaced by blocking. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Do not store in a manner that traps excess humidity.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain steel door and frame work from single source from single manufacturer.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Ceco Door Products; an Assa Abloy Group company.
   2. Curries Company; an Assa Abloy Group company.
   3. Fleming Door Products Ltd.; an Assa Abloy Group company.
   4. MPI Group, LLC. (Metal Products, Inc.)
   5. Pioneer Industries, Inc.
   6. Steelcraft; an Ingersoll-Rand company.
   7. Windsor Republic Doors.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
   1. Per NFPA 80, fire exit doors shall be labeled “Fire Door to Be Equipped with Fire Exit Hardware,” and shall be reinforced and constructed to maintain the rating of the specific listed and labeled fire exit devices mounted on them.

B. Thermally Rated Door Assemblies (Exterior Doors): Provide operable door assemblies with U-factor of not more than 0.38 deg Btu/F x h x sq. ft. when tested according to ASTM C 1363.

2.3 STANDARD STEEL DOORS AND FRAMES, GENERAL

A. Construct steel doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. General: Provide doors and frames of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
   1. Core Construction: Manufacturer's standard polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel stiffener core. Kraft paper honeycomb core is not acceptable.
   2. Fire-Rated Core: Manufacturer's standard, as required to provide fire-protection ratings indicated.
   4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
      a. Provide flush closure at tops of exterior doors.
6. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

7. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Interior Doors: Face sheets fabricated from either cold-rolled steel sheet or metallic-coated sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
   1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

B. Interior Frames: Fabricated from cold-rolled steel sheet or metallic-coated sheet. Comply with ANSI/SDI A250.8 and with details indicated for frame type and profile.
   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as face welded unless otherwise indicated.
   3. Frames for Level 2 Steel Doors: 0.053-inch-thick steel sheet.
   4. Frames for Wood Doors: 0.053-inch-thick steel sheet.
   5. Frames for Borrowed Lights: 0.053-inch-thick steel sheet.

2.5 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
   1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as face welded unless otherwise indicated.
   3. Frames for Level 3 Steel Doors: 0.053-inch-thick steel sheet.

2.6 FRAME ANCHORS

A. Jamb Anchors:
   1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
   2. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042-inch-thick, with corrugated or perforated straps not less than 2-inches-wide by 10 inches long; or wire anchors not less than 0.177-inch-thick.
      a. Provide “offset” masonry “T” anchors for applications at cavity wall construction only. Basis-of-Design Product: Gulfport Industries Inc. #FR 673 with 45-degree offset strap anchor.
4. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

2.7 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B.

B. Frame Anchors: ASTM A 879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011; hot-dip galvanized according to ASTM A 153, Class B.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.

D. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching steel frames of type indicated.

E. Grout: ASTM C 476 and maximum slump of 4 inches, as measured according to ASTM C 143.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 “Glazing.”

2.8 FABRICATION

A. Fire Rated Doors: Fire door and frame preparations for electric and mortised hardware shall be made by the respective door and frame manufacturers. Field modifications shall not be permitted for such hardware.

B. Weight: Weight of any door leaf without hardware shall not exceed 200 pounds unless approved by the Architect.

C. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

D. Steel Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
   1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
   2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

4. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Hardware Preparation: Factory prepare steel doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
   2. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   3. Comply with BHMA A156.115 for preparing steel doors and frames for hardware.

F. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
   1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated. Minimum 0.032-inch-thick, fabricated from same material as face sheet in which they are installed.
      a. Height of Stops and Moldings: 3/4-inch minimum for exterior 1-inch IGU glazing applications and as recommended by glazing manufacturer for other glazing. Unless indicated otherwise, provide standard 5/8-inch height stops where allowed by standards.
   2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of steel doors and frames.
   3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
   4. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.9 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
3.2 INSTALLATION

A. General: Install steel doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Steel Frames: Comply with SDI A250.11.
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
      a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
      b. Install frames with removable stops located on secure side of opening.
      c. Install door silencers in frames before grouting.
      d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
      e. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   2. Fire-Rated Openings: Install fire door assemblies per NFPA 80, the door and frame manufacturers’ installation instructions, and manufacturers’ listing requirements.
   3. Floor Anchors: Secure with post-installed expansion anchors.
      a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
   4. Solidly pack mineral-fiber insulation inside frames.
   5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
   6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
   7. Installation Tolerances: Adjust steel frames to the following tolerances:
      a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
      b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
      c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
      d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Steel Doors: Factory fit and adjust steel doors accurately in frames, within clearances specified below. Adjust installed clearances to meet factory fitting requirements indicated for fabrication. Replace doors and frames that do not meet clearance requirements.
   1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8 unless indicated otherwise.
      a. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
      b. Between Bottom of Door and Top of Bumper or Panic Threshold (not including the stop strip): Maximum 3/16 inch.
   2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
   3. Smoke-Control Doors: Install doors according to NFPA 105.
D. Glazing: Comply with installation requirements in Division 8 Section “Glazing” and with steel door and frame manufacturer's written instructions.

3.3 CLEANING AND TOUCHUP

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in Division 9 Section “Painting.”

END OF SECTION 081113
SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. Undercut: Clearance between bottom of door and top of finish floor or threshold below the door.

1.3 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
   B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
      1. Dimensions and locations of blocking.
      2. Dimensions and locations of mortises and holes for hardware.
      3. Dimensions and locations of cutouts.
      4. Undercuts.
      5. Requirements for veneer matching.
      6. Doors to be factory finished and finish requirements.
      7. Fire-protection ratings for fire-rated doors.
   C. Samples:
      1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.

1.5 INFORMATIONAL SUBMITTALS
   A. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE
   A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Comply with requirements of referenced standard and manufacturer's written instructions.
   B. Package doors individually in plastic bags or cardboard cartons.
   C. Except where exposed to view, mark each door on top rail with opening number used on Shop Drawings. Mark doors on bottom rail where top of door will be exposed to view.
1.8 FIELD CONDITIONS
A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

1.9 WARRANTY
A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eggers Industries.
2. Lambton Doors.
4. VT Industries, Inc.
B. Doors shall be manufactured by hot-press method, bonding faces, crossbands, and core together in a single operation with Type I glue. Doors manufactured by cold-pressing 2 or 3 ply pre-manufactured door skins to multiple cores in the same press will not be accepted.

2.2 FLUSH WOOD DOORS, GENERAL
A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches or less above the sill.
1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges. (UL Category A.)
3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

D. Structural-Composite-Lumber-Core Doors:
      a. Screw Withdrawal, Face: 700 lbf.
      b. Screw Withdrawal, Edge: 400 lbf.

E. Mineral-Core Doors:
   1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
   2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
   3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:
   1. Grade: Custom (Grade A faces).
   2. Species: Select white birch.
   3. Cut: Plain sliced (flat sliced).
   5. Assembly of Veneer Leaves on Door Faces: Running match.
   6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
   7. Veneers for all doors in the Work well-matched for color and grain as approved.
   8. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A.
   9. Core: Where indicated to be structural-composite-lumber or mineral-core.
   10. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
   1. Wood Species: Same species as door faces.
   2. Profile: Flush rectangular beads.
   3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   1. Non-Fire-Rated Wood Doors:
      a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
      b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
      c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
      d. Between Bottom of Door and Top of Bumper or Panic Threshold (not including the stop strip): Maximum 3/16 inch (4.7 mm).
      e. Between Bottom of Door and Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).
   2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
   1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Factory cut and trim openings through doors.
   1. Light Openings: Trim openings with moldings of material and profile indicated.
   2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with

D. Door Weight: Weight of any door leaf without hardware shall not exceed 200 pounds (90.7 kg) unless approved by the Architect.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises, unless indicated otherwise.

B. Factory finish doors.

C. Transparent Finish:
   1. Grade: Custom.
   2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish or System 11, catalyzed polyurethane.
   3. Staining: Match Architect's sample, to provide match to existing doors.
   4. Effect: Open-grain finish.
   5. Sheen: Satin.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
   1. Install fire door assemblies per NFPA 80, the door and frame manufacturers’ installation instructions, and manufacturers’ listing requirements.
   2. Install smoke- and draft-control doors according to NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge. Adjust installed clearances to meet factory fitting requirements indicated for fabrication. Replace doors that do not meet clearance requirements.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416
SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Submit product data for extruded silicone engineered transition assembly (“ETA”).
B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
   2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
      a. Joinery, including concealed welds.
      b. Anchorage.
      c. Expansion provisions.
      d. Glazing.
      e. Flashing and drainage.
   3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
C. Color Samples for Verification: For fluoropolymer finish required for acceptable match with existing, on length of storefront extrusion.
   1. Provide sample of manufacturer’s clear anodized finish with satin sheen on length of storefront extrusion. (Architect will review fluoropolymer and satin anodized finishes at project site to establish acceptable match with existing storefront.)

1.3 INFORMATIONAL SUBMITTALS
A. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
   1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
   2. Incorporate data for specified glazing. Refer to Division 08 Section “Glazing.”
B. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
C. Source quality-control reports.
D. Sample Warranties: For special warranties.
1.4 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.5 QUALITY ASSURANCE
   A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
   B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
      1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.6 WARRANTY
   A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
      1. Failures include, but are not limited to, the following:
         a. Structural failures including, but not limited to, excessive deflection.
         b. Noise or vibration created by wind and thermal and structural movements.
         c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
         d. Water penetration through fixed glazing and framing areas.
         e. Failure of operating components.
      2. Warranty Period: Two years from date of Substantial Completion.
   B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
      1. Deterioration includes, but is not limited to, the following:
         a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
         b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
         c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
      2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 “Quality Requirements,” to design aluminum-framed entrances and storefronts.
   B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this
Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:
   a. Thermal stresses transferring to building structure.
   b. Glass breakage.
   c. Noise or vibration created by wind and thermal and structural movements.
   d. Loosening or weakening of fasteners, attachments, and other components.
   e. Failure of operating units.

C. Structural Loads:
   1. Wind Loads: As indicated on Drawings.
   2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.

E. Structural: Test according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
   1. Fixed Framing and Glass Area:
      a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
   2. Entrance Doors:
      a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
      b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
   1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 8 lbf/sq. ft.
H. Energy Performance: Certify and label energy performance as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.35 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.28 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas shall have a condensation resistance factor of no less than 56 for framing as determined according to AAMA 1503.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURERS
A. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
1. Exterior Storefront: 2- x 4.5-inch-high performance thermally-broken front-set framing:
   a. EFCO “403X.”
   b. Kawneer “451UT.”
   c. Oldcastle “3000 XT.”
   d. YKK AP “YES 45 XT.”
2. Interior Storefront: 2- x 4.5-inch center-set framing:
   a. EFCO “402.”
   b. Kawneer “451.”
   c. Oldcastle “FG 3000.”
   d. YKK AP “YES 45 FI.”
3. Entrances: Heavy duty 2 inch, wide stile:
   a. EFCO “D518 Durastile.”
   b. Kawneer “500 Heavy Wall.”
   c. Oldcastle “Rugged Entrance.”
   d. YKK AP “50M.”
B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING
A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Dual thermal break (exterior) and Nonthermal (interior).
2. Glazing System: Retained mechanically with gaskets on four sides.
5. Fabrication Method: Field-fabricated stick system.
B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
D. Enhanced (High Performance) Sill Flashing System: Provide thermally-broken extruded aluminum sill flashing with 2-inch tall back leg and bottom profile with outboard trough and weep holes to direct water to exterior. Provide full-frame-depth end dams mechanically attached to sill flashing extrusion and sealed with silicone. Provide silicone sill flashing splice sleeves and sealant as required at end dams and penetrations for anchorage. Provide finish to match framing.

E. Offset Anchorage System: Provide frame anchorage incorporating offset anchors and finished extruded cover trim matching storefront framing. Anchorage “clip and cover” system shall be engineered by storefront manufacturer.

F. Materials:
   1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
      a. Sheet and Plate: ASTM B 209.
      b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.

2.4 ENGINEERED TRANSITION ASSEMBLIES (ETA)

A. Engineered Transition Assembly: Air barrier perimeter transition for aluminum entrances and storefront systems. Assembly comprised of the following components:
   1. Silicone Rubber Sheet: Extruded, translucent cured silicone.
      a. Air Infiltration, ASTM E 283: Less than 0.01 cfm when tested with proposed sealant.
      b. Hardness, ASTM D 2240: 40 minimum.
      c. Tensile Strength, ASTM D 412: 800 psi minimum.
      d. Elongation, ASTM D 412: 400% minimum (340% for premolded corners).
      e. Tear Strength, ASTM D 624, Die B: 90 ppi minimum.
      f. Corners: Pre-molded or job-formed and lapped. Mitered abutting corners are not acceptable.
      g. Surface: Textured or ribbed on sealant side(s) to maximize adhesion and shear strength at sealant.
   2. Silicone Sealants: ASTM C 920, single-component, neutral-curing silicone; Type S, Grade NS, approved by silicone rubber sheet manufacturer for use with silicone rubber sheet and with substrates.
   3. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
      a. Dow Corning; “Silicone Transition Strip” and “758 Silicone Weatherbarrier.”
      b. Elbex; “Elbex HS.”
      c. Momentive Performance (GE); “UltraSpan” US1101 and GE “SilPruf.”
      d. Pecora; “XL-Span” and “AVB Silicone.”
      e. Tremco; “Proglaze” ETA and “Spectrem 1 Silicone.”

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
   1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: Wide stile; 5-inch nominal width. Provide 7-inch top and 12-inch bottom rails indicated.

   a. Provide nonremovable glazing stops on outside of door.

2.6 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Division 8 Section “Door Hardware.”

2.7 GLAZING

A. Glazing: Comply with Division 8 Section “Glazing.”

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: Comply with Division 08 Section “Glazing.”

D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

2.8 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
   1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.9 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
8. Provide heavy-duty extrusion sections or steel-reinforced sections for project applications which exceed the structural capacity of standard framing member extrusions. Provide framing members sized to withstand windloads for applications indicated as substantiated by manufacturer’s windload charts.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
   1. At exterior doors, provide compression weather stripping at fixed stops.
   2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
   1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
   2. At exterior doors, provide weather sweeps applied to door bottoms.

G. Door Weight: Weight of any door leaf without hardware shall not exceed 200 pounds (90.7 kg) unless approved by the Architect.

H. Associated Decorative Formed Metal and Accessories: Provide matching aluminum shop-fabrications and manufactured extruded aluminum accessories indicated.
   1. Provide manufacturer’s extruded aluminum exterior sill assemblies of depth and extrusion thickness required for application. Coordinate with storefront sill member to not obstruct weeps and internal drainage, and to maintain flashing of sill condition.
   2. Provide exterior mullion covers utilizing extrusions to greatest extent practical and .080-inch aluminum thickness. Include clip and concealed splicing members required.
   3. Form interior filler panels for closing ends of partition systems and for other applications indicated. Form from minimum .050-inch aluminum, producing a panel of same thickness as partitions or mullions unless otherwise indicated. Incorporate reveals, trim, and concealed anchorages for attaching to adjacent surfaces.
   4. Provide terminations to flush but-joint terminations with concealed fasteners for trim affix to aluminum framing members.
   5. Provide returned ends at trim and closure sections which terminate with uniform width joint and sealant or gasket system as indicated. Do not mechanically fasten such panels to aluminum storefront members.

I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: Match existing as indicated and approved by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section “Joint Sealants” to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Division 08 Section “Glazing.”
G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
   1. Exterior Doors: Install to produce weather-tight enclosure and tight fit at weather stripping.
   2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers’ written instructions using concealed fasteners to greatest extent possible.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
   1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
   2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
      b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
      c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
   4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensure installed storefront and entrance work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 084113
SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 REFERENCES
A. UL - Underwriters Laboratories
   1. UL 10B - Fire Test of Door Assemblies
   2. UL 10C - Positive Pressure Test of Fire Door Assemblies
   3. UL 1784 - Air Leakage Tests of Door Assemblies
   4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute
   1. Sequence and Format for the Hardware Schedule
   2. Recommended Locations for Builders Hardware
   3. Key Systems and Nomenclature

C. ANSI - American National Standards Institute
   1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

1.3 SUBMITTALS
A. General:
   1. Submit in accordance with Conditions of Contract and Division 01 requirements.
   2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
   3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.

B. Action Submittals:
   1. Product Data: Product data including manufacturers’ technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
   2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
      a. Wiring Diagrams: For power, signal, and control wiring and including:
         1) Details of interface of electrified door hardware and building safety and security systems.
         2) Schematic diagram of systems that interface with electrified door hardware.
         3) Point-to-point wiring.
         4) Risers.
   3. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
   a. Door Index; include door number, heading number, and Architect's hardware set number.
   b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
   c. Type, style, function, size, and finish of each hardware item.
   d. Name and manufacturer of each item.
   e. Fastenings and other pertinent information.
   f. Location of each hardware set cross-referenced to indications on Drawings.
   g. Explanation of all abbreviations, symbols, and codes contained in schedule.
   h. Mounting locations for hardware.
   i. Door and frame sizes and materials.
   j. Name and phone number for local manufacturer's representative for each product.
   k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.

1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.

5. Key Schedule:
   a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
   b. Use ANSI/BHMA A156.28 “Recommended Practices for Keying Systems” as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.

1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
   f. Prepare key schedule by or under supervision of supplier, detailing Owner’s final keying instructions for locks.

6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.

C. Informational Submittals:
1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
2. Product Certificates for electrified door hardware, signed by manufacturer:
   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated
doors complies with listed fire-rated door assemblies.
3. Certificates of Compliance:
   a. Certificates of compliance for fire-rated hardware and installation instructions if
      requested by Architect or Authority Having Jurisdiction.
   b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor,
      attesting to completion of installer training meeting specified in “QUALITY
      ASSURANCE” article, herein.
   c. Electrified Hardware Coordination Conference Certification: Letter of compliance,
      signed by Contractor, attesting to completion of electrified hardware coordination
      conference, specified in “QUALITY ASSURANCE” article, herein.
4. Product Test Reports: For compliance with accessibility requirements, based on evaluation
   of comprehensive tests performed by manufacturer and witnessed by qualified testing
   agency, for door hardware on doors located in accessible routes.
5. Warranty: Special warranty specified in this Section.

D. Closeout Submittals:
1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
   a. Complete information on care, maintenance, and adjustment; data on repair and
      replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Name, address, and phone number of local representative for each manufacturer.
   d. Parts list for each product.
   e. Final approved hardware schedule, edited to reflect conditions as-installed.
   f. Final keying schedule
   g. Copies of floor plans with keying nomenclature
   h. As-installed wiring diagrams for each opening connected to power, both low voltage
      and 110 volts.
   i. Copy of warranties including appropriate reference numbers for manufacturers to
      identify project.

1.4 QUALITY ASSURANCE

A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified
   herein.
   1. Where specific manufacturer’s product is named and accompanied by “No Substitute,”
      including make or model number or other designation, provide product specified. (Note:
      Certain products have been selected for their unique characteristics and particular project
      suitability.)
      a. Where no additional products or manufacturers are listed in product category,
         requirements for “No Substitute” govern product selection.
   2. Where products indicate “acceptable manufacturers” or “acceptable manufacturers and
      products”, provide product from specified manufacturers, subject to compliance with
      specified requirements and “Single Source Responsibility” requirements stated herein.

B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with
   record of successful in-service performance for supplying door hardware similar in quantity, type,
and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
4. Coordination Responsibility: Coordinate installation of electronic security hardware with Architect, electrical engineers, and any other fire alarm and security consultants, and provide installation and technical data to Architect and other related subcontractors.
   a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
   b. Upon completion of fire alarm installation, and installation of all hardware connected to fire alarm, inspect and verify that all components are working properly.

C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.

D. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC).
   2. Can provide installation and technical data to Architect and other related subcontractors.
   3. Can inspect and verify components are in working order upon completion of installation.
   5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.

E. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
   1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
   2. Manufacturers that perform electrical modifications and that are listed by testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

F. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

G. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
   1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
H. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

I. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.

J. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in “REFERENCES” article, herein.
   1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).
   2. Maximum opening-force requirements:
      a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
      b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
      c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
   3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
   4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.

K. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01.
   2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      b. Preliminary key system schematic diagram.
      c. Requirements for key control system.
      d. Requirements for access control.
      e. Address for delivery of keys.

L. Pre-installation Conference: Conduct conference at Project site.
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Inspect and discuss preparatory work performed by other trades.
   3. Inspect and discuss electrical roughing-in for electrified door hardware.
   4. Review sequence of operation for each type of electrified door hardware.
   5. Review required testing, inspecting, and certifying procedures.

M. Coordination Conferences:
   1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
      a. Attendees: Door hardware supplier, door hardware installer, Contractor.
      b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.
2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.
   a. Attendees: electrified door hardware supplier, doors and frames supplier, electrified door hardware installer, electrical subcontractor, Fire Alarm Vendor, Owner, Owner’s security consultant, Architect and Contractor.
   b. After meeting, provide letter of compliance to Architect, indicating when coordination conference was held and who was in attendance.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
   1. Deliver each article of hardware in manufacturer’s original packaging.

C. Project Conditions:
   1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
   2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

D. Protection and Damage:
   1. Promptly replace products damaged during shipping.
   2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
   3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

F. Deliver keys to Owner by registered mail or overnight package service.

1.6 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing
conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

F. Coordinate with fire alarm vendor/subcontractor for connections to fire alarm system.

G. Direct shipments not permitted, unless approved by Contractor.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
      a. Closers:
         1) Mechanical: 30 years - LCN 4040XP, 25 Years LCN 1450.
      b. Automatic Operators: 2 years.
      c. Exit Devices:
         1) Mechanical: 3 years.
         2) Electrified: 1 year.
      d. Locksets:
         1) Mechanical: 10 years – Schlage ND, 3 years – Schlage AL.
         2) Electrified: 1 year.
      e. Continuous Hinges: Lifetime warranty.
      f. Key Blanks: Lifetime
   2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

B. Special Installation Warranty: Submit hardware Installer’s warranty, signed by Installer, covering labor and installation for the Work of this Section.
   3. Warranty Period: One year from date of Substantial Completion.

1.8 MAINTENANCE

A. Maintenance Tools:
   1. Furnish two (2) complete sets of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and particular project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”
   1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners
   1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
   2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
   3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
   4. Install hardware with fasteners provided by hardware manufacturer.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
   5. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.3 HINGES

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: Ives 5BB series
   2. Acceptable Manufacturers and Products: Hager BB series, Bommer BB Series

B. Requirements:
   3. Provide five-knuckle, ball bearing hinges conforming to ANSI/BHMA A156.1.
   4. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
      a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
      b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
   5. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
      a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
      b. Interior: Heavy weight, steel, 5 inches (127 mm) high
   6. 2 inches or thicker doors:
      a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
      b. Interior: Heavy weight, steel, 5 inches (127 mm) high
   7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins
10. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
11. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
12. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
13. Provide mortar guard for each electrified hinge specified.
14. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 CONTINUOUS HINGES

A. Aluminum Geared
   1. Manufacturers:
      a. Scheduled Manufacturer: Ives.
   2. Requirements:
      a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
      b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch (6 mm) diameter Teflon coated stainless steel hinge pin.
      c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
      d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
      e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
      f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
      g. Install hinges with fasteners supplied by manufacturer.
      h. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.
2.5 ELECTRIC POWER TRANSFER

A. Manufacturers:
   a. Scheduled Manufacturer: Von Duprin EPT-10
   b. Acceptable Manufacturers: ABH PT1000, Securitron CEPT-10

B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.

C. Locate electric power transfer per manufacturer’s template and UL requirements, unless interference with operation of door or other hardware items.

2.6 FLUSH BOLTS

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:
   1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.7 SURFACE BOLTS

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:
   1. Surface bolts to have 1” throw for maximum security with concealed mounting that prevents vandalism. Units to be constructed of heavy duty steel and cUL listed up to three (3) hours when used on the inactive door of a pair up to 8’ in height.

2.8 COORDINATORS

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:
   1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
   2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.
2.9 MORTISE LOCKS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: Schlage L9000 series
   2. Acceptable Manufacturers and Products: No Substitutions

B. Requirements:
   1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
   2. Indicators: Where specified, provide indicator window measuring a minimum 2 inch x 1/2 inch with 180 degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
   3. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
   4. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
   5. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.
   6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
   7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

2.10 CYLINDRICAL LOCKS – GRADE 2

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: Schlage AL Series
   2. Acceptable Manufacturers and Products: No Substitutions
B. Requirements
   1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 2. Cylinders: Refer to “KEYING” article, herein.
   2. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch (13 mm) latch throw. Provide 2-3/8 inches (60 mm) backset where noted or if door or frame detail requires. Provide proper latch throw for UL listing at pairs.
   3. Provide locksets with separate anti-rotation throughbolts, and no exposed screws. Provide levers that operate independently, and have two external return spring cassettes mounted under roses to prevent lever sag.
   4. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
   5. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides. 

2.11 AUXILIARY LOCKS

A. Deadlocks:
   1. Manufacturers and Products:
      a. Scheduled Manufacturer and Product: Schlage L400 series
   2. Requirements:
      a. Provide mortise deadlock series conforming to ANSI/BHMA A156 and function as specified. Cylinders: Refer to “KEYING” article, herein.
      b. Provide deadlocks with standard 2-3/4 inches (70 mm) backset. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
      c. Provide manufacturer’s standard strike.

2.12 EXIT DEVICES

A. Manufacturer and Product:

B. Requirements:
   1. Provide exit devices tested to ANSI/BHMA A156.3-2014 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to “KEYING” article, herein.
   2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
   3. Quiet Operation: Incorporate fluid damper or other device that eliminates noise of exit device operation.
   4. Touchpad: Extend minimum of one half of door width, but not the full length of exit device rail. Provide end-cap with two-point attachment to door. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. Provide compression springs in devices, latches, and outside trims or controls; tension springs prohibited.
   5. Provide rim devices with a dual cylinder or inside thumb turn cylinder option with a visual security indicator that identifies the trims locked/unlocked status of the door from the inside of the room. Indicator in unlocked state presents a 1/2 inch x 1/2 inch white metal flag with black icon at top of device head. Indicator in locked state has no flag present. Provide rim
devices without the dual cylinder or inside thumb turn cylinder option capable of being retrofitted with the visual security indicator.

6. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrical requirements.

7. Rim Exit Devices: for exterior doors - provide devices with non-tapered smart latchbolt with 90° latchbolt to strike engagement under stress and Static Load Resistance of: 2000 pounds as specified in sets.

8. Provide exit devices with manufacturer’s approved strikes.

9. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.

10. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.

11. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion that is removed by use of a keyed cylinder, which is self-locking when re-installed.

12. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
   a. Lever Style: Match lever style of locksets.
   b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

13. Provide UL labeled fire exit hardware for fire rated openings.

14. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.

15. Provide electrified options as scheduled in the hardware sets.

2.13 CYLINDERS

A. Manufacturers:
   1. Scheduled Manufacturer: ASSA
   2. Acceptable Manufacturers: No Substitutions

B. Requirements:
   1. Provide permanent cylinders/cores to match Owner’s existing key system, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer’s series as indicated. Refer to “KEYING” article, herein.
   2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
      a. Exterior Exits and Locks: Provide ASSA Mortise & Rim Cylinders ASSA Maximum+ #9851
      b. Interior: Exits: Provide ASSA Mortise & Rim Cylinders Maximum+ #9851, Key In Lever: ASSA Maximum+ #98611
   3. Temporary Construction Cylinder Keying.
      a. Provide construction cores that permit voiding construction keys without cylinder removal, furnished in accordance with the following requirements.
         1) Split Key or Lost Ball Construction Keying System.
2.14 KEYING

A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Provide cylinders/cores keyed into Owner’s existing factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

C. Requirements:
   1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      a. Master Keying system as directed by the Owner.
   2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   3. Provide keys with the following features:
      a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
   4. Identification:
      a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication “Keying Systems and Nomenclature” for identification. Blind code marks shall not include actual key cuts.
      b. Identification stamping provisions must be approved by the Architect and Owner.
      c. Stamp cylinders/cores and keys with Owner’s unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with “DO NOT DUPLICATE” along with the “PATENTED” or patent number to enforce the patent protection.
      d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
      e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
   5. Quantity: Furnish in the following quantities.
      a. Change (Day) Keys: 3 per cylinder/core.
      c. Cylinders: 12 each.

2.15 KEY CONTROL SYSTEM

A. Manufacturers:
   1. Scheduled Manufacturer: Telkee
   2. Acceptable Manufacturers: HPC, Lund

B. Requirements:
   1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and
standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
   a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
   b. Provide hinged-panel type cabinet for wall mounting.
   c. Provide typed key log to fit in key box.

2.16 KEY MANAGEMENT SOFTWARE
   A. Manufacturers and Products:
      1. Scheduled Manufacturer and Product: Schlage SITEMASTER 200
      2. Acceptable Manufacturers and Products: Sargent KeyWizard.
   B. Requirements:
      1. Software: Provide tracking, issuing, collecting and transferring information regarding keys. Provide customized query, reporting, searching capability, comprehensive location hardware listings, display key holder photos and signature for verification, and provide automatic reminders for maintenance, back-ups and overdue keys.
      2. Provide training for Owner’s personnel on proper operation and application of key management software.

2.17 DOOR CLOSERS (EXTERIOR DOORS)
   A. Manufacturers and Products:
   B. Requirements:
      1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
      2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
      3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 3/4 inch (19 mm) diameter double heat-treated pinion journal.
      4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
      5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
      6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
      7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
      8. Pressure Relief Valve (PRV) Technology: Not permitted.
      9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
     10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
2.18 DOOR CLOSERS (INTERIOR DOORS)

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: LCN 1450 series

B. Requirements:
   1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
   2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
   3. Closer Body: 1-1/4 inch (32 mm) diameter, with 5/8 inch (16 mm) diameter heat-treated pinion journal and full complement bearings.
   4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
   5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
   6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
   7. Pressure Relief Valve (PRV) Technology: not permitted.
   8. Provide stick on and special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.19 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: LCN Senior Swing
   2. Acceptable Manufacturers and Products: Besam Swingmaster MP, Horton 4000LE series

B. Requirements:
   1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
      a. Opening: Powered by DC motor working through reduction gears.
      b. Closing: Spring force.
      d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
      e. Cover: Aluminum.
   2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
   3. Provide drop plates, brackets, or adapters for arms as required to suit details.
   4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
   5. Provide key switches, with LED’s, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to “KEYING” article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.20 DOOR TRIM

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:
   1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
   2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
   3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
   4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
   5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
   6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
   7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
   8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.21 PROTECTION PLATES

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:
   1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
   2. Sizes of plates:
a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.22 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturers: Glynn-Johnson
   2. Acceptable Manufacturers: Rixson, Sargent

B. Requirements:
   1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
   2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
   3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
   4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.23 DOOR STOPS AND HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Burns, Trimco

B. Provide door stops at each door leaf:
   1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
   2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
   3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.24 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:
   1. Scheduled Manufacturer: Zero International
   2. Acceptable Manufacturers: National Guard, Reese

B. Requirements:
   1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
   2. Size of thresholds:
a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width

3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

4. All systems shall be compliant with the Americans with Disabilities Act, 2010 Standards for Accessible Design.

2.25 SILENCERS

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:
   1. Provide "push-in" type silencers for hollow metal or wood frames.
   2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
   3. Omit where gasketing is specified.

2.26 DOOR POSITION SWITCHES

A. Manufacturers:
   1. Scheduled Manufacturer: Schlage
   2. Acceptable Manufacturers: GE-Interlogix, Sargent

B. Requirements:
   1. Provide recessed or surface mounted type door position switches as specified.
   2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.27 FINISHES

A. Finish: BHMA 626/652 (US26D); except:
   1. Hinges at Exterior Doors: BHMA 630 (US32D)
   2. Continuous Hinges: BHMA 628 (US28)
   4. Protection Plates: BHMA 630 (US32D)
   5. Overhead Stops and Holders: BHMA 630 (US32D)
   6. Door Closers: Powder Coat to Match
   7. Wall Stops: BHMA 630 (US32D)
   8. Latch Protectors: BHMA 630 (US32D)
   9. Weatherstripping: Clear Anodized Aluminum
   10. Thresholds: Mill Finish Aluminum
PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.2 PREPARATION

A. Where on-site modification of doors and frames is required:
   1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
   2. Field modify and prepare existing door and frame for new hardware being installed. Maintain UL labels where they occur.
   3. When modifications are exposed to view, use concealed fasteners, when possible.
   4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
      a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
      b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
      c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
   2. Custom Steel Doors and Frames: HMMA 831.

B. Install each hardware item in compliance with manufacturer’s instructions and recommendations, using only fasteners provided by manufacturer.

C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

H. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
   I. Conduit, junction boxes and wire pulls.
   J. Connections to and from power supplies to electrified hardware.

K. Connections to fire/smoke alarm system and smoke evacuation system.

L. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.

M. Testing and labeling wires with Architect’s opening number.

N. Fire Alarm: Coordinate with Division 28 Section “Digital, Addressable, Fire-Alarm System” for additional connections and interface with fire/smoke alarm system.

O. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

P. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.

Q. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

R. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

S. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

T. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

U. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Architectural Hardware Consultant: Engage qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
   1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices after air balancing is complete, to compensate for final operation of heating and ventilating equipment. Adjust door control devices to comply with referenced accessibility requirements.

B. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
C. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

D. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

E. Occupancy Adjustment: Approximately three (3) months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

F. Provide a report listing each door, indicating any adjustments made.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.8 DOOR HARDWARE SCHEDULE

A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

B. Hardware Sets:
Hardware Set No. 01
Door #1:
1001

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Operational Description:
Door normally closed and secure.
Free Egress at all times by push pad or ADA operator.
Access by presentation of a valid credential to the reader or key override.
Door remains secure with loss of power or activation of fire alarm system.
DPS monitors door position, RX shunts DPS signaling legal exit to security system.
### Hardware Set No. 2

Door #: 1018

#### Each To Have:

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#### Operational Description:

Door normally closed and secure.
Free Egress at all times.
Access by presentation of a valid credential to the reader or key override.
Door remains secure with loss of power or activation of fire alarm system.
DPS monitors door position, RX shunts DPS signaling legal exit to security system.
Hardware Set No. 3
Door #(s):
1016

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Operational Description:
Magnetic Hold Open is continuously energized allowing the doors to be held open under normal building conditions. When the Fire Alarm is activated, power to the Magnetic Hold Open is disconnected causing the doors to close automatically.
Hardware Set No. 4
Door #(s):
1016A

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Operational Description:
Magnetic Hold Open is continuously energized allowing the doors to be held open under normal building
conditions. When the Fire Alarm is activated, power to the Magnetic Hold Open is disconnected causing
the doors to close automatically.

Hardware Set No. 5
Door #(s):
1016B

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Operational Description:
Door normally closed and secure.
Free Egress at all times.
Access by presentation of a valid credential to the reader or key override.
Door remains secure with loss of power or activation of fire alarm system.
DPS monitors door position, RX shunts DPS signaling legal exit to security system.

END OF SECTION 087100
SECTION 092216 – COLD FORMED STEEL FRAMING - NON-STRUCTURAL (CFSF-NS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS
   A. Evaluation Reports: For firestop tracks, from ICC-ES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

2.2 FRAMING SYSTEMS
   A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
      1. Steel Sheet Components: Comply with ASTM C 645 requirements for steel unless otherwise indicated.
      2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653, G40, hot-dip galvanized unless otherwise indicated.
   B. Studs and Runners: ASTM C 645.
      1. Steel Studs and Runners:
         a. Minimum Base-Metal Thickness: Minimum 0.018 inch unless indicated otherwise and as required by ASTM C 754 to meet L/240 deflection limit at a lateral pressure of 5psf. Provide 0.030 inch for high-density board applications, such as ASTM C 1178 tile backing panels and ASTM C 1629 Abuse-Resistant Gypsum Board, and at door frames. Provide minimum 0.030 inch for walls receiving heavy wall-hung items or loads, including but not limited to wall cabinets, wall-hung countertops, TV brackets, liquid tanks, folding and fixed seats, grab bars, handrails, exercise equipment, and shelving greater than 9 inches deep and over 3 feet in length.
         b. Depth: As indicated on Drawings.
   C. Slip-Type Head Joints: Where indicated, provide one of the following:
      1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous C stud bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) ClarkDietrich Building Systems; MaxTrack Slotted Deflection Track.
      2) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
      3) Superior Metal Trim; Superior Flex Track System (SFT).

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. ClarkDietrich Building Systems; Blazeframe Fire Stop Deflection Track.
      b. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
      c. Metal-Lite, Inc.; The System.
      d. Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
   1. Minimum Base-Steel Thickness: 0.0312 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-steel thickness, with minimum 1/2-inch-wide flanges.
   1. Depth: 1-1/2 inches, unless indicated otherwise.
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

   1. Minimum Base-Steel Thickness: 0.018 inch, unless indicated otherwise.
   2. Minimum Base-Steel Thickness at Impact-Resistant Gypsum Board: 0.030 inch, unless indicated otherwise.
   3. Depth: 7/8 inch, unless indicated otherwise.

H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
   1. Depth: 3/4 inch, unless indicated otherwise.
   2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
   3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

I. Corner Angle: Angle with both face flanges of 2-1/2 inches, minimum bare steel thickness of 0.0179 inch.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
B. Isolation Strip at Exterior Walls: Provide one of the following:
   1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
   2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
      1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
   B. Coordination with Sprayed Fire-Resistive Materials:
      1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
      2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistant materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistant materials from damage.

3.3 INSTALLATION, GENERAL
   A. Installation Standard: ASTM C 754. Provide framing to meet L/240 deflection limit at a lateral pressure of 5psf unless indicated otherwise.
      1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
   B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Provide for such indicated construction whether in contract or not. Coordinate for such construction provided by others.
   C. Install bracing at terminations in assemblies.
   D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
   1. Single-Layer Application: 16 inches o.c. unless otherwise indicated. Provide closer spacing if required by ASTM C 754 to meet L/240 deflection limit at a lateral pressure of 5psf.
   2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
   3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate 4 inches above suspended ceilings. Continue framing around ducts penetrating partitions above ceiling. Provide bracing of top track at non full-height framing as indicated.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports; including roof decking, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
      a. Install two studs at each jamb unless otherwise indicated.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
      c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
   3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
   4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
      a. Firestop Track: Install to maintain continuity of fire-resistance-rated assembly indicated.
   5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
   6. Curved Partitions:
      a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
      b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:
   1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
   2. Shim direct furring to produce a uniform surface.

F. Off Furring:
1. Where steel framing is indicated directly beside a primary wall and to receive finish board on only one side, provide bracing to the primary wall at no less than 48 inches o.c. between floor and ceiling. Attach bracing to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216
SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.

1.3 DELIVERY, STORAGE AND HANDLING
   A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS
   A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
   B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
   C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
      1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
      2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
   B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL
   A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD
   A. Gypsum Wallboard: ASTM C 1396.
      1. Thickness: 5/8 inch unless indicated otherwise.
2. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C 1396.
   1. Thickness: 5/8 inch.
   2. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C 1396.
   1. Thickness: 1/2 inch.
   2. Long Edges: Tapered.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Exterior Gypsum Soffit Board: ASTM C 1396, with manufacturer's standard edges.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Gypsum.
      b. CertainTeed Corp.
      c. Continental Building Products Inc.
      d. Georgia-Pacific Gypsum LLC.
      e. National Gypsum Company.
      f. PABCO Gypsum.
      g. Temple-Inland.
      h. USG Corporation.
   2. Core: 5/8 inch, Type X.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   2. Shapes:
      a. Cornerbead.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.
      c. L-Bead: L-shaped; exposed long flange receives joint compound.
      d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
      e. Expansion (control) joint.
      f. Curved-Edge Cornerbead: With notched or flexible flanges.

   1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
   2. Shapes:
      a. Cornerbead.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.
      c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Fry Reglet Corp.
   b. Gordon, Inc.
   c. Pittcon Industries.
   d. Stockton Products.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.

3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
       a. Use setting-type compound for installing paper-faced metal trim accessories.
   3. Fill Coat: For second coat, use drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.
   5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Exterior Applications:
   1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick. (CFSF-S specified in Division 05 Section “Cold-Formed Steel Framing - Structural.”)
D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

E. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Accumetric LLC; BOSS 826 Acoustical Sound Sealant.
      b. BASF; MasterSeal NP 520.
      c. GE Construction Sealants; RCS20 Acoustical.
      d. Grabber Construction Products; Acoustical Sealant GSC.
      e. Hilti CP506 Smoke and Acoustical Sealant.
      f. Pecora Corporation; AC-20 FTR or AIS-919.
      g. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.

F. Thermal Insulation: As specified in Division 07 Section “Thermal Insulation.”

G. Vapor Retarder: As specified in Division 07 Section “Thermal Insulation.”

H. Putty Pads:
   1. Release Lined Pads: Non-hardening endothermic material in pad form, faced on both sides with poly liner, designed to seal around penetrations and wiring devices, enhancing acoustic performance.
   2. Nominal Size: 7-1/4 x 7-1/4 x 3/16 inches.
   3. Products: Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:
      a. STI Firestop; “SpecSeal Putty Pad.”
      b. Hilti; “Firestop Putty Pad CFS-P PA.”
      c. 3M; “Fire Barrier Moldable Putty Pads MPP+.”

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
   B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
   C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL
   A. Comply with ASTM C 840.
B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Install gypsum board with open horizontal joint (gap) not to exceed ½-inch above finished floor slab and tape & finish vertical joints to bottom edge of board to afford a smooth substrate for applied wall base.

F. Form control and expansion joints with space between edges of adjoining gypsum panels.

G. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc., except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

H. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

I. Isolate perimeter of gypsum board ceilings and soffits at surrounding non-gypsum board construction. Provide 1/4- to 1/2-inch-wide spaces at these locations, and trim edges with LC-bead edge trim where edges of gypsum panels are exposed and U-bead edge trim where concealed. Seal joints between edges and surrounding non-gypsum wall surfaces with acoustical sealant.

J. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

K. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations.

L. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

M. Install putty pads on the backside of items penetrating gypsum board on STC-rated walls/partitions. Items include, but are not limited to, wiring devices, cable, conduit, and pipe. Completely cover and seal around each penetration.

3.3 APPLYING INTERIOR GYPSUM BOARD
A. Install interior gypsum board in the following locations:
1. Wallboard Type: Vertical surfaces unless otherwise indicated.
2. Type X: Where required for fire-resistance-rated assembly.
3. Ceiling Type: Ceiling surfaces.

B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners, unless otherwise indicated or required for fire-resistance-rated assembly.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS
A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
   1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
   2. Fasten with corrosion-resistant screws.

3.5 INSTALLING TRIM ACCESSORIES
A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect, and where indicated in drawings.
C. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. U-Bead: Use where indicated.
5. Curved-Edge Cornerbead: Use at curved openings.

D. Exterior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

E. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
   a. Primer and its application are specified in other Division 09 Sections.
4. Level 5: Provide for curved surfaces, where indicated on Drawings, and as follows:
   a. Walls perpendicular to exterior glazing within 20 feet of glazing.
   b. Art walls.
   c. Walls scheduled to receive deep tone accent paint.
   d. Walls indicated to receive “marker board” coating.
   e. Walls indicated to receive wallcoverings.
   f. Primer and its application are specified in other Division 09 Sections.

3.7 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
1. Notify Architect seven days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:
   a. Installation of 80 percent of lighting fixtures, powered for operation.
   b. Installation, insulation, and leak and pressure testing of water piping systems.
   c. Installation of air-duct systems.
d. Installation of air devices.

e. Installation of mechanical system control-air tubing.

f. Installation of ceiling support framing.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900
SECTION 093000 – TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
C. Module Size: Actual tile size plus joint width indicated.
D. Face Size: Actual tile size, excluding spacer lugs.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
   1. Tile patterns and locations.
   2. Widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
   3. Waterproofing details at floor drain, cove base, and threshold.
C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
D. Store liquid materials in unopened containers and protected from freezing.
E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.
1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
   1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.3 TILE PRODUCTS

A. Tile Type [CT-1]: Wall Tile to match existing.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. American Olean; Division of Dal-Tile Corp.
      b. Daltile; Division of Dal-Tile Corporation
      c. Interceramic.
   2. Composition: Match Existing.
   4. Thickness: Match Existing.
   5. Face: Match Existing.
   7. Tile Color and Pattern: As selected by Architect from manufacturer's full range. Match Existing. Multiple colors of tile may be required.
   8. Pattern: Match Existing
   9. Grout Color: Match existing
   10. Location: At all damaged (broken) tile locations. Replace to match existing.
2.4 SETTING MATERIALS

   1. Basis-of-Design Product: Subject to compliance with requirements, provide Mapei “Ultraflex 2” or comparable product by one of the following:
      a. Laticrete International, Inc. 252 Silver
      b. Summitville S-1000 MP Thin-Set Latex Mortar
   2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.5 GROUT MATERIALS

A. Polymer-Modified Tile Grout: ANSI A118.7 and ISO 13007 CG2WAF. (Provide for wall tile applications).
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Mapei “Ultracolor Plus” or comparable product by one of the following:
      a. Bonsal American; an Oldcastle company.
      b. Custom Building Products.
      c. Laticrete International, Inc.
   2. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.

B. Water-Cleanable Epoxy Grout – High Temperature: ANSI A118.3 and ISO 13007 RG.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Mapei “Kerapoxy IEG CQ” or comparable product by one of the following:
      a. Bonsal American; an Oldcastle company.
      b. Custom Building Products.
      c. Laticrete International, Inc.
   2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.

2.6 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section “Joint Sealants.”
   1. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

A. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

B. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Aqua Mix Inc.; “Grout Sealer.”
   b. Bonsal American; an Oldcastle company; Grout Sealer.
   c. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
   d. C-Cure; Penetrating Sealer 978.
   e. Jamo Inc.; Matte Finish Sealer.
   f. MAPEI Corp.; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.
   g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
   i. TEC; subsidiary of H. B. Fuller Co.; “Grout Guard Penetrating Grout Sealer.”

2.8 MIXING MORTARS AND GROUT
   A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
   B. Add materials, water, and additives in accurate proportions.
   C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile. (REPLACE BROKEN TILES, VERIFY AND QUANTIFY LOCATIONS IN THE FIELD). EXISTING TILE WAINSCOT SHALL REMAIN IN PLACE WITH NEW PAINT ABOVE. PAINT NEW WALL WERE DEMOLTION AND NEW CONSTRUCTION OCCURS).
      1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
      2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
      3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE INSTALLATION

A. Comply with TCNA's “Handbook for Ceramic, Glass, and Stone Tile Installation” for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series “Specifications for Installation of Ceramic Tile” that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
   a. Tile floors in wet areas.
   b. Tile floors composed of tiles 8 by 8 inches or larger.
   c. Tile floors composed of rib-backed tiles.

B. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

C. Joint Widths: Install tile with joint widths recommended by tile manufacturer to maintain module size. If tile manufacturer has no recommendation, install tile with the following joint widths:

   4. Decorative Thin Wall Tile: 1/16 inch.

D. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

   1. Remove epoxy and latex-Portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
B. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.5 INTERIOR TILE INSTALLATION SCHEDULE

   a. Tile Type: GWT AND GT
   b. Thin-Set Mortar: Latex-portland cement mortar.
   c. Grout: Water-cleanable epoxy grout.

B. Interior Wall Installations, Metal Studs or Furring:

1. Tile Installation W241: Cement mortar bed (thickset); TCNA W241 and ANSI A108.1B.
   a. Tile Type: CT2
   c. Grout: Polymer-modified sanded grout.

2. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment over cleavage membrane; TCNA W244.
   a. Tile Type: GWT
   b. Thin-Set Mortar: Latex-portland cement mortar.
   c. Grout: Water-cleanable epoxy grout.

3. Tile Installation W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board; TCNA W245.
   a. Tile Type: GT
   b. Thin-Set Mortar: Latex-portland cement mortar.
   c. Grout: Water-cleanable epoxy grout.

END OF SECTION 093000
SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
   A. AC: Articulation Class.
   B. CAC: Ceiling Attenuation Class.
   C. LR: Light Reflectance coefficient.
   D. NRC: Noise Reduction Coefficient.

1.3 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Samples for Initial Selection: For components with factory-applied color finishes.
   C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
      1. Acoustical Panel: Set of 6-inch- (150-mm-) square Samples of each type, color, pattern, and texture.
   D. Installation Instructions: Manufacturer’s installation instructions for specified ceiling assemblies and components.
      1. Include instructions for Armstrong “Infusions” canopy system installations.
   E. LEED Submittals: Refer to Division 1 Section “Sustainable Design Requirements.”
   F. Qualification Data: For testing agency.
   G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
   H. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.
   I. Sample Warranty: For 30-year panel and grid (single source) warranty systems specified.
   J. Maintenance Data: For each panel finish provided to include in maintenance manuals.

1.4 QUALITY ASSURANCE
   A. Source Limitations:
      1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
      2. Suspension System: Obtain each type through one source from a single manufacturer.
   B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
C. Surface-Burning Characteristics: Provide ceiling panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84:
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 50 or less.

D. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
   1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
   1. Indicated stud partition assemblies terminate with a foam gasket isolation strip at underside of suspended ceilings as work of Section 092216. Stud top runner is attached to suspension grid, not acoustical ceiling panels.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Panels: Full-size panels equal to 5 percent of quantity installed. Owner to qualify additional stock in field.
   2. Suspension System Components: Quantity of each exposed component equal to 5 percent of quantity installed. Owner to qualify additional stock in field.
PART 2 - PRODUCTS

PART 1 - PRODUCTS

1.1 ACOUSTICAL PANELS, GENERAL

A. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 20 percent by weight.

B. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

C. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

D. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

E. At space perimeter conditions avoid panel pieces smaller than 3-inches.

1.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING: ACP-1

(TYPICAL, CLASSROOMS AND ADMIN AREAS)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; “School Zone, Fine Fissured #1713” or a comparable product by one of the following manufacturers:

1. CertainTeed Corporation.
2. USG Corporation.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.

2. Pattern: CE (perforated small holes / lightly textured).
1.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING; ACP-2

(MEDIA CENTER, CAFETERIA)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; “Ultima 1943” or a comparable product by one of the following manufacturers:
   1. CertainTeed Corporation.
   2. USG Corporation.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
   1. Type and Form: Type IV, form 2; Fire Class A
   2. Pattern: E

C. Color: White.
D. LR: Not less than 0.87
E. NRC: Not less than 0.80
F. CAC: Not less than 35
G. Edge/Joint Detail: Square
H. Thickness: 7/8 inch
I. Modular Size: 24 by 48 inches
J. Antimicrobial Treatment: Broad spectrum, mold and mildew resistant.

1.4 1.5 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING; ACP-3

(TOILET, STORAGE, ETC.)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; “School Zone Georgian 795” or a comparable product by one of the following manufacturers:
   1. CertainTeed Corporation.
   2. USG Corporation.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
   1. Type and Form: Type III Form 2, other types; wet formed mineral fiber panels with scrubbable finish, resistant to heat and moisture

C. Color: White.
D. LR: Not less than 0.82
E. NRC: Not less than 0.55
F. CAC: Not less than 38
G. Edge/Joint Detail: Square
H. Thickness: 5/8 inch
I. Modular Size: 24 by 48 inches
J. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

1.6 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING; ACP-4

(FOOD SERVICES, ETC.)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; “Kitchen Zone 673” or a comparable product by one of the following manufacturers:

B. Products:
   2. CertainTeed Ceilings.
   3. United States Gypsum Co.

C. Classification: Provide panels complying with ASTM E 1264 for Type XX, other types; described as high-density, ceramic- and mineral-base panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.

D. Pattern: C (Perforated, small holes).

E. Color: White.
F. LR: Not less than 0.82.
G. NRC: Not less than 0.55.
H. CAC: Not less than 40.
I. Edge Detail: Square.
J. Thickness: 5/8 inch.
K. Size: 24 inches by 48 inches.
L. Humidity Resistant: Minimum ten (10) year warranty against sag. Thirty (30) years with Armstrong Suspension System.

1.7 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING – ACP-#5 (NURSE)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; “Optima Health Zone 3115PB” or a comparable product by one of the following manufacturers:

B. Products:
   2. CertainTeed Ceilings.
   3. United States Gypsum Co.

C. Classification: Provide panels complying with ASTM E 1264 for Type XX, other types; described as high-density, ceramic- and mineral-base panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.

D. Pattern: C (Perforated, small holes).

E. Color: White.
F. LR: Not less than 0.86.
H. NRC: Not less than 0.95.
I. CAC: NA
J. Edge Detail: Square.
K. Thickness: 1 inch.
L. Size: 24 inches by 48 inches.
M. Humidity Resistant: Minimum ten (10) year warranty against sag. Thirty (30) years with Armstrong Suspension System.

1.8 METAL SUSPENSION SYSTEMS, GENERAL

A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

B. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Post installed expansion anchors.
b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, 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 ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

E. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

F. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
G. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch-diameter bolts.

H. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

I. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

J. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

K. Hold-Down Clips: Provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees in all entrance vestibules/lobby ceilings, gymnasium and ten feet into building area at all exterior doors.

L. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

1.9 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING ASSEMBLIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; “Prelude XL 15/16” Exposed Tee System” or a comparable product by one of the following manufacturers:
   1. Armstrong World Industries, Inc.
   2. USG Interiors, Inc.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A653/A653M, not less than G30 coating designation, with prefinished 15/16-inch-wide metal caps on flanges.
   2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
   3. Face Design: Flat, flush.

1.10 METAL SUSPENSION SYSTEM FOR FIRE-RATED ACOUSTICAL PANEL CEILING ASSEMBLIES (FOR ACP-4)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; “Prelude Plus XL Fire Guard 15/16 Exposed Tee System” or a comparable product by one of the following manufacturers:
   1. Armstrong World Industries, Inc..
   2. USG Interiors, Inc..

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A653/A 653M, not less than G60 coating designation, with prefinished 15/16-inch-wide metal caps on flanges.
   1. Structural Classification: Heavy-duty system.
   2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
   3. Face Design: Flat, flush.
1.11 METAL EDGE MOLDINGS AND TRIM

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Armstrong World Industries, Inc.
   2. CertainTeed Corporation.
   3. USG Corporation.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
   1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
   2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

1.12 CEILING EXPANSION JOINT SYSTEM

A. Provide extruded resilient polymer flexible joint system to incorporate within suspension system grid at expansion joint locations. Provide for joint width indicated, including fasteners. Provide color selected by Architect from standard colors available.

B. Available Products: Subject to compliance with requirements, provide products of one of the following:
   2. Balco Model AC-20 (ceiling-to-ceiling) & AC-25 (ceiling to wall)

3.2 PREFINISHED ALUMINUM PERIMETER TRIM SYSTEM

a. Products: Subject to compliance with requirements, provide one of the following:
   2) Chicago Metallic Corporation
   3) USG Interiors, Inc.

b. Extruded Aluminum alloy trim system finished in baked polyester paint. 6-inch exposed horizontal face, with vertical face recessed. System detailed for compatibility with suspended acoustical panel ceiling grid system.
   1) Provide perimeter edge trim system for applications indicated in conjunction with metal suspension system for clouds
   a) Finish: Match grid system unless noted otherwise.

PART 4 - EXECUTION
4.1 EXAMINATION
A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

4.2 PREPARATION
A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

4.3 INSTALLATION
A. General: Install acoustical panel ceilings to comply with ASTM C 636, UBC Standard 25-2 and seismic design requirements indicated, per manufacturer's printed instructions and CISCA's "Ceiling Systems Handbook."
1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
3. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
9. Provide supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

a. Edge moldings and trim shall be caulked with sealant at perimeter of wall assemblies in all room locations and corridors. (See Section 07 92 00 Joint Sealants for type of sealant specified for Acoustical Panel Ceiling edge moldings and trim.)

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.

2. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's printed instructions, unless otherwise indicated.

4.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's printed instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

a. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1) Proceed with installation only after unsatisfactory conditions have been corrected.

2. PREPARATION

a. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3. INSTALLATION

a. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
b. Suspend ceiling hangers from building's structural members and as follows:
   1) Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2) Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3) Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4) Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5) Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   6) When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   7) Do not attach hangers to steel deck tabs.
   8) Do not attach hangers to steel roof deck. Attach hangers to structural members.
   9) Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
   10) Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

c. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

d. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
   1) Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
2) Apply acoustical sealant in a continuous bead at top edge of vertical legs of moldings after they are installed.

3) Do not use exposed fasteners, including pop rivets, on moldings and trim.

e. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

f. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1) Arrange directionally patterned acoustical panels as indicated in finish schedule or directed by Architect.

2) For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.

3) For reveal-edged panels on suspension system runners, install panels with bottom of (factory- and field-cut) reveal edge in firm contact with top surface of runner flanges.

4) Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

5) At perimeter locations around rooms/spaces where the grid layout results in tiles of less than 6-inches in width, provide 2’ x 4’ tiles to cut to the resulting dimension plus 2-feet.

g. Canopy Installation: Install canopies in accordance with the most current manufacturer’s instructions: LA- 297055 and in compliance with the authorities having jurisdiction.

4. CLEANING

a. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113
SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
A. Product Data: For each type of product indicated.
B. LEED Submittals: Refer to Division 1 Section “Sustainable Design Requirements”.
C. Samples for Initial Selection: For each type of product indicated.
D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
E. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.3 QUALITY ASSURANCE
A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 PROJECT CONDITIONS
A. Maintain ambient temperatures within range recommended by manufacturer, but not below 70 deg F or above 95 deg F, in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.
B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
C. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS
A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.
PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:
   1. Available Type TS (rubber, vulcanized thermoset) Products: Provide one of the following or alternate complying material acceptable to Architect.
      a. Johnsonite; “Baseworks, Coved (Toe) Profile”. (Basis of Design)
      b. Burke Flooring, Division of Burke Industries; “BurkeBase - Cove Base.”
      c. Flexco (USA), Inc.; “Wallflowers Premium – Cove.”
      d. Nora Rubber Flooring; “4” Cove Base S1028 B.”
      e. Roppe Corporation; “Pinnacle Rubber Base – Style B (Cove).”

   1. Material Requirement and Manufacturing Group: Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
   2. Style: Cove (base with toe)

C. Minimum Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside and Inside Corners: Job formed.

G. Finish: As selected by Architect from manufacturer's full range.

H. Colors and Patterns: As selected by Architect from full range of industry colors.

I. Hard surface flooring installed in the building shall meet one of the following three requirements:
   1. Meet the requirements of the FloorScore standard (current as of the date of this rating system, or more stringent version) as shown with testing by an independent third-party.
   2. Demonstrate maximum VOC concentrations less than or equal to those specified in the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda, using the office scenario as defined in Table 7.5 within the practice.
   3. Maximum VOC concentrations meet the California requirements specified above based on the following:
      a. California Department of Public Health (CDPH) Standard Method V1.1-2010 using test results obtained at the 14 day time point.

J. Provide new wall base where new flooring is to be installed. Repair wall base as needed, to match existing, in all other areas.

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. **Johnsonite. (Basis of Design)**
   b. Burke Flooring, Division of Burke Industries
   c. Flexco, Inc.
   d. R.C.A. Rubber Company (The).
   e. Roppe Corporation, USA.
   f. VPI, LLC; Floor Products Division.

B. **Description:** Provide for the following applications as indicated (Basis-of-Design product is indicated):
   1. Carpet edge for glue-down applications: Roppe #38 or #39 to suit carpet thickness
   2. Reducer strip for resilient flooring .080 inch x 1 inch: Roppe #21 (linoleum)
   3. Reducer strip for resilient flooring 1/8 inch x 1 inch: Roppe #22
   4. Reducer strip for resilient flooring 3/16 inch x 1 inch: Roppe #23
   5. Reducer strip for resilient flooring 1/8 inch x 1.5 inch: Roppe #45
   6. Reducer strip 1/8 inch to .080 inch x 1 inch: Roppe #59 (VCT to linoleum)
   7. Joiner for tile and carpet 7/32 inch tile: Roppe #50

C. **Material:** Rubber.

D. **Profile and Dimensions:** As indicated

E. **Colors and Patterns:** As selected by Architect from full range of industry colors.

F. Provide reducer strips where new flooring is to be installed. Replace as needed, to match existing, in all other areas.

2.3 **INSTALLATION MATERIALS**

A. **Trowelable Leveling and Patching Compounds:** Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. **Adhesives:** Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
   1. Adhesives applied inside the weatherproofing system shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168 volatile organic compound (VOC) limits as required for LEED. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

C. **Stair-Tread-Nose Filler:** Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. **Metal Edge Strips:** Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

E. **Floor Polish:** Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

**PART 3 - EXECUTION**

3.1 **EXAMINATION**

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. 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.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
D. Do not install resilient products until they are same temperature as the space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION
A. Comply with manufacturer's written instructions for installing resilient base.
B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
E. Do not stretch resilient base during installation.
F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
   2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION
   A. Comply with manufacturer's written instructions for installing resilient accessories.
   B. Resilient Stair Accessories:
      1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
      2. Tightly adhere to substrates throughout length of each piece.
      3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
   C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and/or resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION
   A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
   B. Perform the following operations immediately after completing resilient product installation:
      1. Remove adhesive and other blemishes from exposed surfaces.
      2. Sweep and vacuum surfaces thoroughly.
      3. Damp-mop surfaces to remove marks and soil.
   C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
   D. Cover resilient products until Substantial Completion.

END OF SECTION 096513
SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: For location of demolition and replacement of existing vinyl composition Tile. Provide new vinyl composition tile to match existing.
      1. Show details of special patterns.
   C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.3 QUALITY ASSURANCE
   A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1.4 DELIVERY, STORAGE, AND HANDLING
   A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.5 FIELD CONDITIONS
   A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
      1. 48 hours before installation.
      2. During installation.
      3. 48 hours after installation.
   B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
   C. Close spaces to traffic during floor tile installation.
   D. Close spaces to traffic for 48 hours after floor tile installation.
   E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
      1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
B. Hard surface flooring installed in the building shall meet one of the following three requirements:
   1. Meet the requirements of the FloorScore standard (current as of the date of this rating system, or more stringent version) as shown with testing by an independent third-party.
   2. Demonstrate maximum VOC concentrations less than or equal to those specified in the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda, using the office scenario as defined in Table 7.5 within the practice.
   3. Maximum VOC concentrations meet the California requirements specified above based on the following:
      a. California Department of Public Health (CDPH) Standard Method V1.1-2010 using test results obtained at the 14 day time point.

C. Adhesives applied inside the weatherproofing system shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168 volatile organic compound (VOC) limits as required for LEED. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

2.2 VINYL COMPOSITION FLOOR TILE (VCT TO MATCH EXISTING IN AREAS INDICATED ON DRAWINGS)

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Armstrong World Industries, Inc; “Imperial Texture Standard Excelon.” (Basis of Design)

B. Tile Standard: ASTM F 1066-1985, Class 2 (through-pattern tile). Pattern and colors on the surface of the tile shall extend entirely through the thickness of the tile. Changes in the appearance of the pattern through the thickness of the tile are not acceptable. “Through-color” composition tile is not acceptable.

C. Wearing Surface: Smooth

D. Thickness: 0.125 inch.

E. Size: 12 by 12 inches.

F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
   1. Adhesives applied inside the weatherproofing system shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168 volatile organic compound (VOC) limits as required for LEED. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.
C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

EXECUTION

2.4 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

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

2.5 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.

3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.

4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
   a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. (2.26 kg of water/92.9 sq. m) in 24 hours.
   b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
   c. In the event relative humidity is unable to be achieved, provide flooring manufacturer’s recommended moisture mitigation product as described in installation materials.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.
2.6 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
   1. Lay tiles square with room axis unless indicated otherwise.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
   1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Scribe, cut, and fit floor tiles to butt neatly and tightly to pre-cut VCT tile insert for applications indicated.

A. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles into toe spaces, door reveals, closets, and similar openings.

B. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

C. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

D. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

2.7 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

A. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish. Apply a minimum of two coats, or as recommended by the flooring manufacturer.

B. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
C. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 096519
SECTION 096566.16 - VINYL ATHLETIC FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Shop Drawings: Show installation details and locations of the following:
      1. Floor patterns.
      2. Layout, colors, widths, and dimensions of game lines, markers, and graphics.
      3. Locations of floor inserts for athletic equipment installed through flooring.
      4. Seam locations for sheet flooring.
   C. Samples: For each type, color, and pattern of flooring indicated, 6-inch- square Samples of same
      thickness and material indicated for the Work.
      1. Game-Line- and Marker-Paint Samples: Include Sample sets showing game-line- and
         marker-paint colors applied to flooring.
      2. Seam Samples: For each vinyl sheet flooring color and pattern required; with seam running
         lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by
         Installer for this Project.
   D. Qualification Data: For qualified sheet vinyl flooring Installer.
   E. Maintenance Data: For flooring to include in maintenance manuals.

1.3 QUALITY ASSURANCE
   A. Resilient Athletic Flooring Manufacturer Qualifications:
      1. The indoor resilient multipurpose surfacing shall be manufactured in an ISO 9001 certified
         plant.
      2. The indoor resilient multipurpose surfacing shall be manufactured in an ISO 14001
         certified plant.
      3. The indoor resilient multipurpose surfacing supplier shall be an established firm
         experienced in the field and appointed as a distributor by the manufacturer of the indoor
         resilient multipurpose surfacing.
   B. Testing: Submit shock absorption (force reduction) test results of the indoor resilient athletic
      flooring system when tested in accordance with one of the following standards and certified by
      an independent testing laboratory approved to perform such testing.
      1. ASTM F2772, Class 2 “Athletic Performance Properties of Indoor Sport Floor Systems.”
   C. Sheet Vinyl Flooring Installer Qualifications: An experienced Installer who has completed sheet
      vinyl flooring installations using seaming methods indicated for this Project and similar in
      material, design, and extent to that indicated for this Project; who is acceptable to manufacturer;
      and whose work has resulted in installations with a record of successful in-service performance.
1.4 DELIVERY, STORAGE, AND HANDLING
A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.
B. Store materials to prevent deterioration. Store rolls upright.

1.5 FIELD CONDITIONS
A. Adhesively Applied Products:
   1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
   2. After post-installation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F or more than 95 deg F.
   3. Close spaces to traffic during flooring installation.
   4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.
B. Install flooring after other finishing operations, including painting, have been completed.

1.6 WARRANTY
A. Special Warranty for Resilient Athletic Flooring System: Manufacturer's standard form in which manufacturer agrees to repair or replace components of resilient athletic flooring installation that fail in materials or workmanship within specified warranty period.
   1. Warranty against material defects for a period of not less than two (2) years.
   2. The resilient athletic flooring manufacturer will warrant the installation (when installed according to all manufacturer’s installation guidelines) moisture levels up to 10 lbs per ASTM F1869 and 92% RH per ASTM F2170.
B. Installation Warranty: The installation of the indoor resilient athletic floor shall be covered against poor workmanship and faulty installation by a two (2) year written, limited warranty provided by the manufacturer-approved installer.

1.7 EXTRA MATERIALS
A. Furnish extra materials, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Sheet Flooring: Furnish full-width rolls of not less than 10 linear feet for each 500 linear feet or fraction thereof, of each type, color, and pattern of flooring installed.

PART 2 - PRODUCTS

2.1 SHEET VINYL FLOORING
A. Manufacturers - ASTM F2772, Class 2: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Amaro Products.
   2. Gerflor USA; “Rec 60” (Basis of Design product)
3. Tarkett Sports.

B. Description: ASTM F2772, Class 2 Sheet vinyl flooring specifically designed for adhered athletic flooring applications.

C. Physical Properties:
   1. Ball Rebound (ASTM F2772: >90% required) >90%
   2. Shock Absorption (EN 14808: >25% required) 32% +/-3%
   3. Force Reduction (ASTM F2772, Class 2) 22% - 33%

D. Sheet Vinyl Flooring with Backing: ASTM F 1303.
   1. Type (Binder Content): Type I, minimum binder content of 90 percent.
   2. Wear-Layer Thickness: Grade 1.
   3. Minimum Overall Thickness: 6.0 mm.
   5. Reinforcing: Non-woven fiberglass mesh.
   7. Finish: A wood look design as available from the indoor resilient athletic flooring manufacturer’s standard range.
   8. Provide manufacturer’s specialty flooring composition and adhesives required for flooring system performance class specified.
   9. High Density Resilient Underlayment: Provide manufacturer’s field-constructed combination of a ± 2mm vinyl floor surface with a 4mm solid high-density resilient underlayment as recommended by manufacturer.
   10. Provide manufacturer’s specialty flooring composition and adhesives required for flooring system over concrete slab with moisture conditions not to exceed 12 lbs per ASTM F1869 and 92% per ASTM F2170. Provide Manufacturer’s Moisture Mitigation System for moisture conditions

2.2 ACCESSORIES


B. Moisture Vapor Treatment (MVT): Where flooring is installed over concrete slabs, provide the following:
   1. Subject to compliance with requirements, provide alkaline-resistant product designed to control excessive moisture vapor transmission through concrete slab, and approved by the flooring manufacturer, equivalent to one of the following:
      a. Duraamen Engineered Products, Inc.; “Perdure MVT.”
      b. Maxxon Corporation; “Maxxon MVP.”
      c. Tnemec Company, Inc.; “Epoxoprime MVT, Series 208.”
   2. Verify with flooring manufacturer that submitted product maintains compliance with all provisions of flooring manufacturer’s warranty.
   3. Low-VOC: Provide product with VOC content less than 15 g/L.
   4. Bond Strength to Concrete: Minimum 400 psi per ASTM D 4541 (100% concrete failure).
   5. Permeance: Maximum 0.1 perm per ASTM E 96, and 0.10 grains/hr/ft²/in-Hg, per ASTM F 3010.
   6. Applications: Provide MVT for all concrete slabs on-grade and lightweight concrete elevated slabs.
C. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated. Provide manufacturer’s specialty adhesives required for flooring system performance class specified.

1. Color to blend with the indoor resilient athletic surfacing color or design. All seams shall be welded to create a monolithic and impermeable surface.

E. Game-Line and Marker Paint: Complete system including primer, if any, compatible with flooring and recommended in writing by flooring and paint manufacturers for use indicated.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance of the Work.
1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

3.2 PREPARATION
A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of flooring.

B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
3. Moisture Testing:
   a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 6 lb of water/1000 sq. ft. in 24 hours.
   1) Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.
   b. Perform relative humidity test using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 83 percent relative humidity level measurement.

4. Moisture Testing: Perform tests so that each test area does not 1000 sq. ft. (92.9 sq. m) and perform not less than 2 tests in each installation area and with test areas evenly spaced in installation areas.
   a. Perform anhydrous calcium chloride test according to ASTM F 1869.
   b. Perform relative humidity test using in situ probes according to ASTM F 2170.
5. Moisture Vapor Treatment (MVT): After initial moisture testing is complete, prepare slab and install MVT in accordance with manufacturer’s written instructions. If moisture testing indicates measurements are within acceptable levels for flooring installation without need of moisture vapor treatment, MVT may be omitted where approved by the Architect.
   a. After installation of MVT, perform final moisture tests to verify that moisture-vapor-emission rate is at an acceptable level for flooring installation. Proceed with flooring installation only after substrates demonstrate a moisture-vapor-emission rate and relative humidity not more than maximum indicated.
      1) Moisture-Vapor-Emission Rate: Maximum 3 lbs. of water/1,000 sq. ft. (1.36 kg of water/92.9 sq. m.) in 24 hours, unless indicated otherwise by flooring manufacturer’s requirements.
      2) Relative Humidity: Maximum 75 percent relative humidity, unless indicated otherwise by flooring manufacturer’s requirements.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.

D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.
   1. Do not install flooring until they are same temperature as space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.

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

3.3 FLOORING INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions.

B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.

C. Extend flooring into toe spaces, closets, and similar openings unless otherwise indicated. Extend flooring to center of cased openings and to center under door leafs at door openings unless indicated otherwise. Where transitions occur to another flooring material, extend or cut flooring to suit transition.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, non-staining marking device.

3.4 SHEET FLOORING INSTALLATION

A. Unroll sheet flooring and allow it to stabilize before cutting and fitting.

B. Lay out sheet flooring as follows:
   1. Maintain uniformity of flooring direction.
   2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Locate seams per approved Shop Drawings.
5. Locate color field areas accomplished with separate color sheet flooring.
   a. Contrasting color border for game floor [basketball court]
   b. Contrasting color key areas of basketball court.

C. Adhered Flooring: Adhere product to substrate using a full spread of adhesive applied to substrate in accordance with adhesive and flooring manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

D. Telescoping Stands (Bleachers): At bleacher paths, field-construct a combination of a ± 2mm vinyl floor surface with a 4mm solid high-density resilient underlayment as recommended by manufacturer. Create a smooth heat-welded transition between the sport floor field and the higher density system at bleacher path.

E. Vinyl Sheet Flooring Seams: Prepare and finish seams to produce surfaces flush with adjoining flooring surfaces.
1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor system.

3.5 GAME LINES AND MARKERS

A. Mask flooring at game lines and markers and apply paint to produce sharp edges. Where crossing, break minor game line at intersection; do not overlap lines.

B. Lay out game lines and markers to comply with rules and diagrams published by National Federation of State High School Associations for athletic activities indicated.
1. Game Lines and Markers: Apply game-line and marker paint to game floor surface according to paint manufacturer's written instructions.
   a. Mask flooring at game lines and markers, and apply paint to produce lines and markers with sharp edges.
   b. At game line intersections, break the minor game line; do not overlap lines.
   c. Apply finish coats after game-line and marker paint is fully cured.
   d. Provide school and team name graphics for main court as indicated. Owner will furnish graphic data for installer.
   e. Provide contrasting color game lines.

3.6 CLEANING AND PROTECTING

A. Perform the following operations immediately after completing flooring installation:
   1. Remove adhesive and other blemishes from flooring surfaces.
   2. Sweep and vacuum flooring thoroughly.
   3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.

B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096566.16
SECTION 096813 – TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.
   B. Shop Drawings: Show the following:
      1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
      2. Carpet tile type, color, and dye lot.
      3. Type of subfloor.
      4. Type of installation.
      5. Pattern of installation.
      6. Pattern type, location, and direction.
      7. Pile direction.
      8. Type, color, and location of insets and borders.
      9. Type, color, and location of edge, transition, and other accessory strips.
     10. Transition details to other flooring materials.
   C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
   D. LEED Submittals: Refer to Division 1 Section “Sustainable Design Requirements.”
   E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.
   C. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
      1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
      2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.
   B. Warranty: Special warranty specified in this Section.
1.5 QUALITY ASSURANCE
   A. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.6 SUBSTITUTIONS:
   A. Prequalifications: Manufacturers seeking consideration as an acceptable alternative to the specified carpet tile material must submit samples, specifications and certified test data a minimum of 10 days prior to receipt of bids to the Architect. Materials not meeting all product, technical and performance criteria will not be considered.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Comply with CRI Carpet Installation Standard, Section 5, “Storage and Handling.”

1.8 PROJECT CONDITIONS
   A. Comply with CRI Carpet Installation Standard, Section 7 “Site Conditions – All Installations” Section 11 “Ventilation.”
   B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
   C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
   D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.9 WARRANTY
   A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
      1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
      2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and delamination.
      3. Warranty Period: 10 years from date of Substantial Completion.

1.10 EXTRA MATERIALS
   A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..
PART 2 - PRODUCTS

2.1 CARPET TILE PRODUCTS: Provide specified carpet tile or prequalified alternate carpet tile only. No substitutions will be considered after award of Contract.

A. Carpet installed inside the weatherproofing system shall meet one of the following three requirements:
   1. Meets the testing and product requirements of the Carpet and Rug Institute Green Label Plus, OR
   2. Maximum VOC concentrations are less than or equal to those specified in the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda, using the office scenario as defined in Table 7.5 within the practice. The additional VOC concentration limits listed in Section 9.1a must also be met, OR
   3. Maximum VOC concentrations meet the California requirements specified above based on the following:
      a. California Department of Public Health (CDPH) Standard Method V1.1-2010 using test results obtained at the 14 day time point.

B. Carpet cushion installed inside the weatherproofing system shall meet the testing and product requirements of the Carpet and Rug Institute’s Green Label program.

2.2 CARPET TILE (C-1 Offices and Admin Areas where indicated, C-2 Media Center)

A. Manufacturer: Milliken Carpet
   1. Contact: Carlo Puller (202.510.4409)
   2. Product Name: “Color Field”
   3. Color: To be determined by Architect
   4. Fiber Content: Milliken-Certified WearOn® Nylon Type 6,6
   5. Tile Size: 25 cm x 1 m (9.8” x 39.4”)
   6. Tufted Face Weight 20 oz/yd2
   7. Finished Pile Height .14” (3.56 mm)
   8. Finished Pile Thickens .11” (2.79 mm)
   10. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm.
   11. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute’s “Green Label Plus” program.

2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, 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 applied inside the weatherproofing system shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168 volatile organic compound
2. For carpet adhesive, concrete, wood, bamboo and cork floor finishes, and tile setting adhesives, compliance can be demonstrated with test results of:
   a. Total volatiles fraction, based on one of the following, provided that water and exempt compounds are subtracted from total volatiles test results and the mass VOC content is calculated consistent with SCAQMD Rule 1113 and Rule 1168:
      1) ASTM D2369
      2) EPA method 24
      3) ISO 11890 part 1
   b. Total volatile organic compounds fraction, based on one of the following, provided that all VOCs with a boiling point up to 280°C are included, and exempt compounds are subtracted from total volatiles test results and the mass VOC content is calculated consistent with SCAQMD Rule 1113 and Rule 1168.
      1) ASTM D6886
      2) ISO 11890 part 2

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
   B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
      1. Slab substrates are dry and free of curing compounds, sealers, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
      2. Subfloor finishes comply with requirements specified in Division 3 Section “Cast-in-Place Concrete” for slabs receiving carpet tile.
      3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
   C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. General: Comply with CRI Carpet Installation Standard, Section 7 “Site Conditions – All Installations,” and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
   B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
   C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI Carpet Installation Standard, Section 18 “Modular Carpet,” and with carpet tile manufacturer's written installation instructions.

B. Installation Method: Brick/Plank pattern as recommended in writing by carpet tile manufacturer for specific pattern used.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings. Extend carpet tile to center of cased openings and to center under door leafs at door openings unless indicated otherwise. Where transitions occur to another flooring material, extend or cut carpet tile to suit transition.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, non-staining marking device.

G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.

2. Remove yarns that protrude from carpet tile surface.


B. Protect installed carpet tile to comply with CRI Carpet Installation Standard, Section 20 “Protection of Indoor Installations.”

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

3.5 OWNER TRAINING:

A. Instruct Owner’s personnel responsible for maintaining installed carpet in accordance with manufacturer’s published recommendations. Carpet manufacturer’s technical representative shall conduct a training seminar for Owner’s Lead of Facilities Maintenance and selected supervisors to demonstrate manufacturer’s recommended cleaning, spot cleaning and preventive maintenance procedures of the installed carpet products.

1. Conduct the training seminar within the Substantially Completed facility, utilizing cleaning equipment purchased by the Owner for facilities maintenance.

2. Training seminar shall include both demonstrations and hands-on cleaning of the installed product(s) by Owner’s personnel.
3. Carpet manufacturer’s technical representative shall digitally record the training seminar and furnish the Owner with two (2) copies (in DVD format) for future instruction of Facilities Maintenance personnel.

END OF SECTION 096813
SECTION 099100 – PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DESCRIPTION OF WORK:
   A. Extent of painting work is indicated on drawings and schedules, and as herein specified.
   B. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout Project, except as otherwise indicated.
      1. Identification of fire- and smoke-rated walls: Provide markings and identification in accordance with the applicable building code requirements, including IBC, Section 703.7.
      2. Identification of fire- and smoke-rated walls: At fire-rated and smoke-rated walls, provide 1-inch high painted stencil lettering above finished ceilings and on the inside of ceiling access doors which provide access to such walls. Locate lettering at 8'-0" maximum horizontal intervals on both sides of concealed walls. Lettering shall be in all capital letters, in fluorescent “safety orange” paint color, stating description of fire-rated wall assembly and hourly rating.
         a. Provide descriptions as applicable in the following format, substituting actual hour rating and type for sample rating and type:
            1) ONE HOUR FIRE BARRIER.
            2) ONE-HALF HOUR FIRE PARTITION.
            3) THREE HOUR FIRE WALL.
            4) ONE HOUR SMOKE BARRIER.
         b. For incidental accessory use separations, provide the following:
            1) SMOKE-RESISTANT PARTITION.
         c. Do not provide lettering at rated wall that are exposed to view (that is, in spaces without dropped ceilings).
         d. Refer to the Life Safety Plans and Partition types for rated wall locations; and reflected ceiling plans for concealed rated wall locations.
      3. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
      4. Painted Patterns and Accent Colors: Location of multi-color paint patterns and accent color areas are indicated in “Interior Accent Paint Color Schedule” on Drawings.

C. Work includes field painting of exposed bare and covered pipes and ducts, and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work. (Labeling on pipes and ducts, including possible stencil lettering, is included in Division 21, 22 and 23 work.) Exposed to view ductwork shall be painted an accent color.

D. “Paint” as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers, fillers, & other applied materials whether used as prime, intermediate or finish coats.

E. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in “schedules.” Where items or surfaces are not specifically mentioned to be painted, paint the same as similar
adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.

F. Following categories of work are not included as part of field-applied finish work.
   1. Pre-Finished Items: Unless otherwise indicated, do not field-paint items specified for factory- or installer-finishing; such as toilet enclosures, acoustic materials, architectural woodwork, mechanical and electrical equipment, switchgear and distribution cabinets.
   2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, and pipe spaces, and elevator and duct shafts.
   3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
   4. Operating Parts: Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts will not require finish painting.

G. Following categories of work are included under other sections of these specifications.
   1. Shop Primers: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work and similar items.
   2. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories is included under other sections of these specifications.

H. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates. Do not paint over fire alarm devices, sprinklers and similar fire safety devices.

1.3 QUALITY ASSURANCE:
   A. Single Source Responsibility: Provide primers, other undercoat paint, and finish coat products produced by same manufacturer for each paint system. Use only thinners approved by paint manufacturer, and use only within recommended limits.
   B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.
      1. Test primers, bonding primers and coating products for compatibility and adhesion to existing substrates.
   C. Color Selection Sample Areas: Architect will designate required field sample area colors and locations when color schedule is issued. Final acceptance of those colors will be from job-applied samples.

1.4 SUBMITTALS:
   A. Inspection Report: Paint manufacturer’s technical representative will inspect existing facility to confirm the existing paint systems, and note substrates which require bond or barrier coating to render them compatible with specified paint systems. Submit copy of report to Architect.
      1. Inspector shall identify MPI DSD 3 Degree of Surface Degradation surfaces (“severely deteriorated paint”) recommended to have paint film completely removed.
B. **Product Data:** Submit manufacturer's technical information including Paint label analysis and application instructions for each material proposed. Include paint system schedule in the format used in this specification section.

1. For DTM enamel and water-borne epoxy enamel products, provide the following performance data.
   a. Abrasion Resistance test data per ASTM D4060 with CS-17 wheel, 1000-gram load for 1000 cycles. (CS-10 wheel data not acceptable).
   b. Direct Impact Resistance test data per ASTM D2794.
   c. Adhesion test data per ASTM D4541.

C. **Color Chips:** Submit color chips of manufacturer's *complete range of colors* for each paint type for Architect's review of color and texture (sheen). These will be used for initial color selection if the submitted range is adequate.

1. Based on products of the selected manufacturer and paint systems specified in this Section, the Architect will prepare an initial color schedule indicating paint colors to be used in each space. The Architect will indicate required colors by referencing the selected paint manufacturer's color chips, or by referencing drawdowns or other standard (such as "match laminate color").

2. Provide 8-1/2 x 11 inch color samples ("drawdowns") for all paint colors and sheens for which the color in Architect’s color schedule is not indicated by colors of the selected paint manufacturer for approval prior to application in the field. Provide paint drawdowns in finish sheens applicable to those in the field.

### 1.5 DELIVERY AND STORAGE:

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material.
2. Manufacturer's stock number and date of manufacture.
3. Manufacturer's name.
4. Contents by volume, for major pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

C. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take precautions to ensure workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

### 1.6 JOB CONDITIONS:

A. Apply paints only when temperature of surfaces to be painted and surrounding air are between 50°F and 90°F for waterbase paints; and between 45°F and 95°F for solvent-thinned paints, unless otherwise permitted by paint manufacturer's printed instructions.

B. Do not paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.

1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature and humidity limits specified by paint manufacturer during application and drying periods.
C. Wind: Do not spray coatings if wind velocity exceeds manufacturer's recommended limit.

D. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.

E. Dust and Contaminants:
   1. Schedule coating work to avoid excessive dust and airborne contaminants.
   2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Paint Manufacturer: Subject to compliance with requirements, provide products of one of the following:
   1. Benjamin Moore and Co. (Ben Moore).
   2. PPG Architectural Coating/PPG Paints (PPG).

B. Special Coatings Manufacturer: Subject to compliance with requirements, provide moisture curing aliphatic urethane coating system products of one of the following or prequalified other manufacturer:
   1. Benjamin Moore and Co. (Ben Moore).
   2. PPG Architectural Coating/PPG Paints (PPG).

2.2 MATERIALS:

A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

B. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated. Lead content in pigment, if any, is limited to contain not more than 0.06% lead, as lead metal based on the total non-volatile (dry-film) of paint by weight.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been correct in a manner acceptable to Applicator.

B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.
3.2 SURFACE PREPARATION:

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Cleaning: Before applying paint or surface treatments, clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove oil and grease prior to mechanical cleaning.
2. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
3. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

D. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, and to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.

1. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

E. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, suitable solvent, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
2. When transparent finish is required, use specified sealer (varnish) for backpriming.

F. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

1. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.

G. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent. Provide wash coat if required by paint system manufacturer for prepared substrate.

3.3 MATERIALS PREPARATION:

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain paint mixing and application containers in a clean condition, free of foreign materials and residue.
C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.4 APPLICATION:

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Provide access to representative of selected coating manufacturer for observation of material application only at all times during painting work. Unless specifically indicated by Architect, this representative shall have no authority to make decisions about the work.
2. Paint surface treatments and finishes are indicated in “schedules” of Contract Documents.
3. Provide finish coats that are compatible with prime paints used.
4. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
5. Paint surfaces behind movable and permanently fixed equipment and furniture.
6. Paint duct interior surfaces visible through registers or grilles, with flat, non-specular black paint.
7. Paint back sides of access panels, and removable or hinged covers.
8. Finish exterior and interior doors on tops, bottoms and side edges same as faces.
9. Sand lightly between each succeeding enamel or varnish coat.
10. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless required to prevent “show-through” for finish topcoats.

B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish total DFT indicated or as recommended by coating manufacturer.

D. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces. Do not paint prefinished equipment items unless directed otherwise.

E. Prime Coats: Apply prime coat to material which is required to be painted or finished, and which has not been prime coated by others. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

F. Finish Coats: Provide finish quality for new and repainted surfaces as follows:
1. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.
G. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

H. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 CLEAN-UP AND PROTECTION:

A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or damage finished surfaces.

B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work until date of Substantial Completion. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

1. Provide “Wet Paint” signs to protect newly-painted finishes. Remove temporary protective wrappings provided by others for their work after completion of painting.

2. At completion of work of other trades, touch-up & restore all damaged painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE:

A. General: Provide the following Paint systems for the various substrates, as indicated.

B. Zinc-Coated or Zinc-rich Primer-Coated Metal with Direct to Metal (“DTM”) Gloss Acrylic Enamel Finish: 2 topcoats of DTM gloss enamel over primer, with min. total DFT of 2.5 mils.

1. Prime Coat (Tie-Coat): Lead-free, acrylic base interior/exterior galvanized metal primer, premium grade. Apply over shop primer.
   - Ben Moore: HP04 Ultra Spec HP Acrylic Metal Primer
   - PPG 90-712 Pitt-Tech Int/Ext Primer/Finish Industrial Enamel
   - S-W: B66 Pro-Cryl Universal Primer.

2. First and Second Coats: DTM Acrylic Gloss Enamel.
   - Ben Moore: HP28 Ultra Spec HP Acrylic Gloss Enamel
   - PPG 90-1310 Pitt-Tech Plus Int/Ext High Gloss DTM Industrial Enamel
   - S-W: B66W1050 Series Pro Industrial DTM Acrylic Coating (Gloss)

C. Cast Iron Downspout Boots with Direct to Metal (“DTM”) Gloss Acrylic Enamel Finish: 2 topcoats of DTM gloss enamel over universal bonding primer, at 2.5 mils over standard shop primer.

1. Prime Coat (Tie-Coat): (Same as for zinc-coated metal.)
2. First and Second Coats: DTM Acrylic Gloss Enamel. (Same as for zinc-coated metal.)

D. Field-Applied Coatings for Ferrous Metal (AESS): Aliphatic urethane system of intermediate coat and topcoat. Provide scheduled products for exposed steel fabrications indicated.

1. Field Touch-up: Match moisture curing urethane zinc-rich shop primer.
2. Intermediate Coat: Moisture curing urethane and micaceous iron oxide or epoxy.
   - Corotech (Ben Moore): V160 Epoxy Mastic Coating
   - PPG 95-245 Pitt-Guard Rapid Coat D-T-R Epoxy Coating
   - S-W: Macropoxy 646 Fast Cure Epoxy, B58-600/B58v600
3. **Top Coat:** Aliphatic urethane at 2.0 – 3.0 mils DFT  
   Corotech (Ben Moore): V500 Aliphatic Acrylic Urethane – Gloss  
   PPG: 95-812 Pitthane Ultra Gloss Urethane Enamel  
   S-W: Corothane I Aliphatic Finish Coat B65

E. **Coatings to Repaint Exterior Ferrous Metal:** Aliphatic urethane topcoat system over surface-tolerant epoxy mastic. Provide to repaint existing exposed steel fabrications with extended weather exposure deterioration and surface rust.

   1. **Preparation:** Clean steel to SSPC SP-3 Power Tool Cleaning to remove all rust scale, mill scale and loose rust, oil, grease and other contaminants.
   2. **Primer:** Surface-tolerant fast curing polyamide epoxy (mastic). 5.0 – 10.0 mils DFT  
      Ben Moore: P45 Mastic Epoxy Gloss Coating  
      PPG: 95-245 Pitt-Guard Rapid Epoxy Mastic SG  
      S-W: Macropoxy 646 Fast Cure Epoxy
   3. **First and Second Top Coats:** Aliphatic urethane at 3.0 – 4.0 mils DFT per coat  
      Ben Moore: P74 Aliphatic Acrylic Urethane  
      PPG: Pitthane High Build Urethane Enamels 95 -8800 series  
      S-W: B65-300 Series/B60V30 Hi-Solids Polyurethane

F. **Concrete:** Acrylic latex satin finish, two finish coats over alkali-resistant primer with minimum total DFT of not less than 3.5 mils.

   1. **Prime Coat:** Exterior Acrylic weathered masonry sealer/primer.  
      Ben Moore: N066 Super Spec 100% Acrylic Masonry Sealer.  
      PPG: 4-603 Perma-Crete Int/Ext Alkali Resistant Primer  
      S-W: A24w8300, Loxon Concrete & Masonry Primer
   2. **First and Second Finish Coats:** Exterior 100% Acrylic – Satin sheen; premium grade.  
      Ben Moore: N096 Moorglo Latex House and Trim Paint.  
      PPG: 76-45 Sun-Proof Ext House & Trim. Satin  
      S-W: A 82 Series A-100 Exterior Latex Satin

G. **Concrete Masonry Units:** Acrylic latex satin finish, two finish coats over primer with minimum total DFT of not less than 3.5 mils. Color shall match brick masonry.

   1. **Prime Coat:** Exterior Acrylic weathered masonry sealer/primer.  
      Ben Moore: 206 Super Spec Block Filler  
      PPG: 6-15 Speedhide Int/Ext Acrylic Masonry Block Filler  
      S-W: A24W200 Loxon Block Surfacer.
   2. **Two Finish Coats:** Exterior 100% Acrylic – Satin sheen; premium grade.  
      Ben Moore: N096 Moorglo Latex House and Trim Paint.  
      PPG: 76-45 Sun-Proof Ext House & Trim. Satin  
      S-W: A 82 Series A-100 Exterior Latex Satin

H. **Exterior Glass-Fiber Reinforced Concrete (GFRC column covers) with Acrylic Latex Finish:**  
   Top coat(s) for total DFT of 6.0 mils minimum over primer-sealer.

   1. **Prime Coat:** Exterior Acrylic weathered masonry sealer/primer.  
      Ben Moore: N066 Super Spec 100% Acrylic Masonry Sealer.  
      PPG: 4-2 Perma-Crete High Build 100% Acrylic Primer  
      S-W: A24W300 Loxon Masonry Acrylic Primer.
   2. **First and Second Finish Coats:** Exterior 100% Acrylic, High Build – Flat; premium grade.
I. Exterior Cement Plaster (Stucco) with Acrylic Latex [Satin] Finish: Top coat(s) for total DFT of [3.5 mils][6 mils] minimum over primer/sealer.
      Ben Moore: N066 Super Spec 100% Acrylic Masonry Sealer.
      PPG: 4-2 Perma-Crete High Build 100% Acrylic Primer
      S-W: A24W300 Loxon Masonry Acrylic Primer.
   2. First and Second Finish Coats: Exterior 100% Acrylic – Satin sheen; premium grade.
      Ben Moore: N096 Moorglo Latex House and Trim Paint.
      PPG: 184 Super Spec 100% Acrylic Exterior Satin Finish (prem. prof. grade)
      S-W: A 82 Series A-100 Exterior Latex Satin
   3. First and Second Finish Coats: Exterior 100% Acrylic, High Build – Flat; premium grade. Minimum 6-8 mils DFT over primer.
      Ben Moore: 056 SuperSpec Masonry 100% Acrylic Elastomeric Coating Flat
      PPG: 4-22 Perma-Crete High Build 100% Acrylic Topcoat Smooth
      S-W: A5, Sherlastic 100% Acrylic Elastomeric

J. Exterior Gypsum Soffit Board with Heavy Duty Textured Coating: Top coat(s) for total DFT of 10.0 mils minimum over primer-sealer.
      Ben Moore: 023 Fresh Start All Purpose 100% Acrylic Int/Ex Latex Primer
      PPG: 4-603 Perma-Crete Interior/Exterior Alkali Resistant Primer
      S-W: B51-450, Multi-Purpose Primer
   2. First and Second Coats: High-build acrylic-latex texture coating. (select texture)
      Ben Moore: 055 SuperSpec Masonry 100% Acrylic Elastomeric Coating Low Lustre
      PPG: 4-50 Perma-Crete 100% Acrylic Texture Coating
      S-W: A44W800 UltraCrete Textured Masonry Topcoat

K. Exterior Gypsum Soffit Board with Smooth Finish 100% Acrylic Coating: Top coat(s) for total DFT of 10.0 mils minimum over primer-sealer.
      Ben Moore: N023 Fresh Start All Purpose 100% Acrylic Int/Ex Latex Primer
      PPG: 6-9 Speedhide Exterior Wood Primer Oil
      S-W: B51-450, Multi-Purpose Primer
   2. First and Second Finish Coats: Exterior 100% Acrylic – Flat finish; premium grade.
      Ben Moore: N105 MoorLife 100% Acrylic Flat House Paint.
      183 Super Spec 100% Acrylic Ext. Flat paint (prem. prof. grade)
      PPG: 72-45 Sun-Proof Ext House & Trim. Flat Latex 100% Acrylic
      S-W: A 6 Series Exterior Latex Flat

L. General Painted Wood and Plywood with Acrylic Latex Satin Finish: 2 finish coats over primer with total DFT not less than 3.5 mils.
      Ben Moore: 176 SuperSpec Alkyd Exterior Primer
      PPG: 6-9 Speedhide Exterior Wood Primer
DOUGLAS MACARTHUR AT TANEY AVENUE
ALEXANDRIA CITY PUBLIC SCHOOLS, ALEXANDRIA, VA
Architect’s Project No: 550502

2. First and Second Finish Coats: Exterior 100% Acrylic – Satin sheen; premium grade.
   Ben Moore: N096 Moorglo Latex House and Trim Paint.
   184 Super Spec 100% Acrylic Exterior Satin Finish (prem. prof. grade)
   PPG: 76-45 Sun-Proof Ext House & Trim, Satin.

M. Exterior Wood Dumpster Enclosure Siding and Trim with Solid Color Latex-Emulsion Stain: 2 Finish coats.
      Ben Moore: N089 Acrylic Solid Siding Stain
      Cabot: Cabot O.V.T. Solid Color Acrylic Stain
      PPG: Olympic Solid Color Acrylic Latex Base Stain
      S-W: A16, Woodscapes Exterior Solid Acrylic Stain

3.7 INTERIOR PAINT SCHEDULE:

A. General: Provide the following paint systems for the various substrates, as indicated. Dry film thickness is noted as “DFT.” Provide compatibility test areas on existing painted substrates.

B. Concrete Masonry Units: Low-VOC Acrylic Satin Finish. 2 Coats over filler, with total DFT not less than 2.5 mils. (Provide for CMU except where “epoxy finish” is indicated.)
   1. Filler Coat: Acrylic-latex Block Filler. Apply filler coat at a rate to ensure complete coverage with pores filled. Brush, spray or roller apply and back roll.
      Ben Moore: 571 Ultra Spec Hi-Build Masonry Block Filler
      PPG 6-15 Speedhide Interior/Exterior Acrylic Masonry Block Filler
   2. First & Second Finish Coats: Interior Low-VOC Acrylic Satin Finish. (Low lustre/Satin = 25-45% @60°) Provide for wall finishes unless indicated otherwise.
      Ben Moore: 374 Eco-Spec WB Zero VOC Interior Eggshell
      PPG 9-300 Pure Performance Interior Eggshell Latex
      S-W: B9 Harmony Low Odor Interior Latex Eg-Shel

   Ben Moore: N376 Eco SpecWB Zero VOC Interior Semi-Gloss
   PPG 9-500 Pure Performance Interior Semi-Gloss Latex
   S-W: B10 Harmony Low Odor Interior Latex Semi-Gloss

C. Concrete Masonry Units - Semi-Gloss Water-Borne Epoxy Finish (EPX-PT): 2 Coats over filler:
   1. Block Filler Coat: Acrylic-latex or as required by manufacturer for topcoat. Brush, spray or roller apply and back roll for smooth pinhole-free treatment.
      Ben Moore: 571 Ultra Spec Hi-Build Masonry Block Filler
      PPG: 6-15 Speedhide Int/Ext Acrylic Masonry Block Filler
      PPG: 16-90 Pitt-Glaze WB Int/Ext Block Filler Latex
      S-W: B42W46 Heavy Duty Interior/Exterior Block Filler.
   2. First and Second Coats: Two-component, semi-gloss water-borne epoxy enamel applied at a DFT of 1.5 to 4.0 mils per coat. Polyamide-epoxy.
      Corotech (Ben Moore): V400 Polyamide Epoxy Coating
      PPG: 98-100 Aquapin WB Water Base Epoxy – Semi-Gloss
      S-W: B73V300 Pro Industrial Water Based Catalyzed Epoxy Hardener
D. Gypsum Board Systems with Latex Finish: Satin (egg-shell) finish at walls, and flat finish on ceilings except as noted. Provide best commercial Low-VOC formulation with 0 VOC per EPA test method 24.

1. Filler Coat: 0 VOC (per EPS test method 24) Latex Primer
   - Ben Moore: 534 Ultra Spec 500 Primer Flat
   - PPG: 6-4900 Speedhide Zero VOC Interior Latex Primer
   - S-W: B28-2600 ProMar 200 Zero VOC Interior Latex Primer

2. First & Second Finish Coats: Interior Low-VOC Acrylic Satin Finish. (Low lustre/Satin = 25-45% @60°) Provide for wall finishes unless indicated otherwise.
   - Ben Moore: 538 Ultra Spec 500 Eggshell
   - PPG: 6-4300 Speedhide Zero VOC Interior Eggshell Latex
   - S-W: B20-2600 ProMar 200 Zero VOC Interior Latex Egg-Shel
   - S-W: B24-2600 ProMar 200 Zero VOC Interior Latex Low Sheen

   - Ben Moore: 536 Ultra Spec 500 Flat
   - PPG: 6-4100 Speedhide Zero VOC Interior Latex Flat
   - S-W: B30-2600 ProMar 200 Zero VOC Interior Latex Flat

E. Ferrous Metal: Semi-Gloss Direct to Metal (“DTM”) Acrylic Enamel Finish: 2 Coats over primer, with total DFT not less than 5.0 mils.

1. Prime Coat: Lead-free, acrylic Base Primer. Not required on shop primed items.
   - Ben Moore: HP29 Ultra Spec HP DTM Acrylic Semi-Gloss
   - PPG: 90-712 Pitt-Tech Int/Ext Primer/Finish Industrial Enamel
   - S-W: B66 W1 DTM Acrylic Primer/Finish (or B66 W200)

2. Bonding Primer (previously painted): Acrylic bonding primer designed for previously painted ferrous metal to ensure secure bond. Brush, spray or roller apply and back roll.
   - Ben Moore/Insl-x 110 Stix Bonding Primer
   - PPG: 90-912 Pitt-Tech Plus DTM Industrial Primer
   - S-W: B66A50 DTM Bonding Primer

3. First and Second Coat: DTM Acrylic Semi-Gloss Enamel. (30-40 units @ 60°)
   - Ben Moore: HP29 Ultra Spec HP DTM Acrylic Semi-Gloss
   - PPG: 90-1210 Pitt-Tech Int/Ext Semi-Gloss DTM Industrial Enamel
   - S-W: B66W1150 Series Pro Industrial DTM Acrylic Semi-Gloss Coating

4. First and Second Coat: DTM Acrylic Satin Enamel. (15-25 units @ 60°)
   - Ben Moore: HP25 Ultra Spec HP DTM Acrylic Low Lustre
   - PPG: 90-1110 Pitt-Tech Int/Ext Satin DTM Industrial Enamel
   - S-W: B66W1250 Series Pro Industrial DTM. Acrylic Egg-Shel

F. Zinc-Coated Metal: Semi-Gloss Direct to Metal (“DTM”) Acrylic Enamel Finish: 2 Coats over primer, with min. total DFT of 2.5 mils.

1. Prime Coat: Lead-free, acrylic base interior galvanized metal primer, premium grade.
   - Ben Moore: HP04 Ultra Spec HP Acrylic Metal Primer
   - PPG: 90-712 Pitt-Tech Int/Ext Primer/Finish Industrial Enamel
   - S-W: B66W1150 Series Pro Industrial DTM Acrylic Semi-Gloss Coating

First and Second Coats: DTM Acrylic Semi-Gloss Enamel. Same as for ferrous metal.

END OF SECTION 099100
SECTION 101100 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS
A. Tackboard: Framed or unframed, tackable, visual display board assembly.
B. Visual Display Board Assembly: Visual display surface that is factory fabricated into composite panel form, either with or without a perimeter frame; includes chalkboards, markerboards, and tackboards.
C. Visual Display Surface: Surfaces that are used to convey information visually, including surfaces of chalkboards, markerboards, tackboards, and surfacing materials that are not fabricated into composite panel form but are applied directly to walls.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for visual display surfaces.
B. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.
   1. Show locations of panel joints.
   2. Show locations of special-purpose graphics for visual display surfaces.
   3. Include sections of typical trim members.
   4. Wiring Diagrams: For power, signal, and control wiring.
C. Samples for Initial Selection: For each type of visual display surface indicated, for units with factory-applied color finishes, and as follows:
   1. Physical samples of manufacturer’s full range of porcelain-enamel face and natural cork tack strip.
   2. Physical sample of manufacturer’s full range of woven fabric-face cork tackboards
D. Product Schedule: For visual display surfaces.
E. Qualification Data: For qualified Installer.
F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.
G. Maintenance Data: For visual display surfaces to include in maintenance manuals.
H. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE
A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of, sliding visual display units required for this Project.
B. Source Limitations: Obtain visual display surfaces from single source and manufacturer.
C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-built visual display surfaces, including factory-applied trim where indicated, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.

B. Store visual display surfaces vertically with packing materials between each unit.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install visual display surfaces until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Surfaces lose original writing and erasing qualities.
      b. Surfaces exhibit crazing, cracking, or flaking.
   2. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
   1. Provide one of the following:
      a. ASTM A 424, enameling-grade steel, uncoated thickness indicated; with exposed face and edges coated with primer, 1.7-to-2.5-mil-thick ground coat, and 2.0-to-2.5-mil-thick color cover coat; and with concealed face coated with primer and 1.7-to-2.5-mil-thick ground coat. Cover and ground coats shall be fused to steel at manufacturer's standard firing temperatures but not less than 1250 deg F.
      b. Porcelain-enamel-clad, ASTM A 463/A 463M, Type 1, stretcher-leveled aluminized steel, with 0.024-inch uncoated thickness; with porcelain-enamel coating fused to steel at approximately 1000 deg F.
   2. Matte Finish: Low reflective; chalk wipes clean with dry cloth or standard eraser.
B. Melamine: Thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
C. High-Pressure Plastic Laminate: NEMA LD 3.
D. Natural Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.
E. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd.; with surface-burning characteristics indicated.
F. Particleboard: ANSI A208.1, Grade M-1, made with binder containing no urea formaldehyde.
G. Clear Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality Q3, with exposed edges seamed before tempering.
H. Extruded Aluminum: ASTM B 221, Alloy 6063.

2.2 MARKERBOARD ASSEMBLIES
A. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and porcelain-enamel face sheet with high-gloss finish.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. AARCO Products, Inc.
      b. ADP Lemco, Inc.
      c. American Visual Display Products
      d. Bangor Cork Company, Inc.
      e. Best-Rite Manufacturing.
      f. Claridge Products and Equipment, Inc.
      i. Platinum Visual Systems; a division of ABC School Equipment, Inc.
   2. Particleboard Core: 3/8 inch with 0.005-inch-thick, aluminum foil
   3. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

2.3 TACKBOARD ASSEMBLIES
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. AARCO Products, Inc.
   5. Egan Visual Inc.
2.4 VISUAL DISPLAY RAILS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. AARCO Products, Inc.
   2. Bangor Cork Company, Inc.
   5. Ghent Manufacturing, Inc.

B. General: Manufacturer's standard, aluminum-framed, tackable cork visual display surface fabricated into narrow rail shape and designed for displaying material.

2.5 RAIL SUPPORT SYSTEM FOR VISUAL DISPLAY BOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Best-Rite Manufacturing.
   2. Egan Visual Inc.
   3. KOH Design, Inc.
   4. Peter Pepper Products, Inc.

B. Support Rails: Horizontal, wall-mounted, extruded-aluminum rails designed to receive hanger clip and to support visual display boards; capable of gripping and suspending paper directly from rail.
   1. Finish: Clear anodic
   2. Color and Gloss: As selected by Architect from manufacturer's full range.

2.6 MARKERBOARD AND TACKBOARD ACCESSORIES

A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch-thick, extruded aluminum; standard size and shape.
   1. Field-Applied Trim: Manufacturer's standard, snap-on trim with no visible screws or exposed joints.

B. Chalktray: Manufacturer's standard, continuous.
   1. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

C. Map Rail: Provide the following accessories:
   1. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches wide.
   2. End Stops: Located at each end of map rail.
   3. Map Hooks: Two map hooks for every 48 inches of map rail or fraction thereof.
   4. Flag Holder: One for each room.
2.7 FABRICATION

A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.

B. Visual Display Boards: Factory assemble visual display boards unless otherwise indicated.
   1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.

C. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.
   1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
   2. Provide manufacturer's standard vertical-joint spline system between abutting sections of markerboards.
   3. Provide manufacturer's standard mullion trim at joints between markerboards and tackboards of combination units.
   4. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.

D. Modular Visual Display Boards: Fabricated with integral panel clips attached to core material.

E. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.
   1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. 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 approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.10 VISUAL DISPLAY SURFACE SCHEDULE

A. Visual Display Board (MB) Factory assembled.
1. Markerboard: Porcelain-enamel markerboard assembly.
   a. Color: White
2. Corners: Square
3. Width: As indicated on Drawings
4. Height: As indicated on Drawings
5. Mounting: Wall
6. Mounting Height: As indicated on Drawings
8. Accessories:
   b. Map rail with display rail, end stops flag holder.
9. All Teaching Walls should be complete and components intact. Replace existing on an as needed basis to be decided by ACPS. In addition, replace existing/ or provide new in other locations to be determined by ACPS.

B. Tackboard (TB) Factory assembled.
1. Tack Surface: Natural-cork tackboard assembly
2. Corners: Square
3. Width: As indicated on Drawings
4. Height: As indicated on Drawings
5. Mounting: Wall
6. Mounting Height: As indicated on Drawings
7. Edges: Concealed by trim
8. All Teaching Walls should be complete and components intact. Replace existing on an as needed basis to be decided by ACPS. In addition, replace existing/ or provide new in other locations to be determined by ACPS.

C. Tack Strips: Factory assembled.
1. Tack Surface: Natural-cork tackboard assembly
2. Size: 2 inches high by length indicated on the Drawings.
4. Ends: Aluminum.
5. Aluminum Finish: Clear anodic finish.
6. All Teaching Walls should be complete and components intact. Replace existing on an as needed basis to be decided by ACPS. In addition, replace existing/ or provide new in other locations to be determined by ACPS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of [motor-operated, sliding visual display units.] [electronic markerboards.]
C. Examine walls and partitions for proper preparation and backing for visual display surfaces.
D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Comply with manufacturer's written instructions for surface preparation.
B. Clean substrates of substances that could impair the performance of and affect the smooth, finished surfaces of visual display boards, including dirt, mold, and mildew.
C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.

3.3 INSTALLATION, GENERAL
A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

3.4 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY BOARDS AND ASSEMBLIES
A. Visual Display Boards: Attach visual display boards to wall surfaces with egg-size adhesive gobs at 16 inches o.c., horizontally and vertically.
B. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.
   1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.
      a. Attach chalk trays to boards with fasteners at not more than 12 inches o.c.

3.5 CLEANING AND PROTECTION
A. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.
B. Touch up factory-applied finishes to restore damaged or soiled areas.
C. Cover and protect visual display surfaces after installation and cleaning.

END OF SECTION 101100
SECTION 101400 – SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 DEFINITIONS

1.3 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. LEED Submittals: Refer to Division 1 Section “Sustainable Design Requirements.”
   C. Shop Drawings: Show fabrication and installation details for signs.
      1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
      2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
      3. Provide floor plans showing locations of signs as approved by the Owner, corresponding to the Signage Schedule and Owner-approved Message Schedule.
   D. Samples for Initial Selection: For each type of sign material indicated that involves color selection.
   E. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
      1. Plaque Casting: 6 inches square including border.
      2. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element). Show character style, material, finish, and method of attachment.
      4. Approved samples will not be returned for installation into Project.
   F. Sign Schedule: Use same designations indicated on Drawings.
   G. Qualification Data: For Installer.
   H. Maintenance Data: For signs to include in maintenance manuals.
   I. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE
   A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
   B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
   1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
      a. Illuminated Exit Signs: Refer to Division 26.
      b. Tactile Exit Signs.
      c. Stairway Identification.
      d. Room Capacity.
      e. Elevator Signs.
      f. Accessible Spaces.
      g. Directional Signs.

1.5 PROJECT CONDITIONS
   A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
   B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION
   A. Coordinate placement of anchorage devices with templates for installing signs.

1.7 WARRANTY
   A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
      1. Failures include, but are not limited to, the following:
         a. Deterioration of metal and polymer finishes beyond normal weathering.
         b. Deterioration of embedded graphic image colors.
      2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS
   A. Aluminum Castings: ASTM B 26, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
   B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
   C. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).
   D. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
      1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
2. Tensile Strength: 9000 lb/sq. in. per ASTM D 638.
3. Flexural Modulus of Elasticity: 340,000 lb/sq. in. per ASTM D 790.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

E. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 PANEL SIGNS
A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Allen Industries Architectural Signage
   3. APCO Graphics, Inc.
   4. ASI-Modulex, Inc.
   5. Best Sign Systems Inc.
   7. Innerface Sign Systems, Inc.
   8. InPro Corporation
   9. Matthews International Corporation; Bronze Division.
   13. Supersine Company (The)

B. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
   1. Phenolic-Backed Photopolymer Sheet: Provide light-sensitive, water-wash photopolymer face layer bonded to a phenolic base layer to produce a composite sheet with overall, face layer, and base-layer thicknesses, respectively, of 0.160, 0.040, and 0.120 inch.
      a. Available Product: Subject to compliance with requirements, a product that may be incorporated into Work includes, but is not limited to, “Jet-388 (1/8-inch) Phenolic Interior Signage” by JetUSA.
   2. PETG-Backed Photopolymer Sheet: Provide light-sensitive, water-wash photopolymer face layer bonded to PETG base layer to produce a composite sheet with overall, face layer, and base-layer thicknesses, respectively, of 0.120, 0.040, and 0.080 inch.
      a. Available Product: Subject to compliance with requirements, a product that may be incorporated into Work includes, but is not limited to, “NovAcryl PT Series Interior Signage” by Nova Polymers.
   3. Edge Condition: Square cut.
   4. Corner Condition: Rounded to 1/2-inch radius.
   6. Color & Style: As selected by Architect from manufacturer's full range.
   7. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
C. Exterior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:

1. Aluminum Sheet: 0.080 inch thick.
2. Edge Condition: Square cut.
3. Corner Condition: Rounded to 1/2-inch radius.
   a. Wall mounted.
   b. Manufacturer's standard noncorroding anchors for substrates encountered.
5. Custom Paint Colors: Match Pantone color matching system.
6. Color & Style: As selected by Architect from manufacturer's full range.

D. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.

2. Raised-Copy Thickness: Not less than 1/32 inch.

2.3 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

B. Adhesives applied inside the weatherproofing system shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168 volatile organic compound (VOC) limits as required for LEED. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

2.4 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.

1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.
B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items, including anchor inserts, are sized and located to accommodate signs.

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

3.2 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls, to the right of the right hand door for double active doors. Locate tactile signs to maintain a clear space beyond swing of door, centered on and in front of each sign, of 18 inches by 18 inches.

B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.

1. Silicone-Adhesive Mounting: Use liquid-silicone adhesive recommended in writing by sign manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended in writing by sign manufacturer to hold sign in place until adhesive has fully cured.

2. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.
C. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

1. Bottom Rail Mounting: Mount aluminum characters to aluminum C-channel rail with black enamel finish. Drill and tap characters with flattened base for bottom mounting, and bottom mount to aluminum rail with stainless steel screws.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101400
SECTION 102123 - CUBICLE CURTAINS AND TRACK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include durability, laundry temperature limits, fade resistance, applied curtain treatment, and fire-test-response characteristics for each type of curtain fabric indicated.
   2. Include data for each type of track.
B. Shop Drawings:
   1. Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
   2. Include details on blocking above ceiling.
C. Samples: For each exposed product and for each color and texture specified, 10 inches in size.
D. Samples for Initial Selection: For each type of curtain material indicated.
E. Samples for Verification: For each type of product required, prepared on Samples of size indicated below:
   1. Curtain Fabric: 10-inch-square swatch or larger as required to show complete pattern repeat, from dye lot used for the Work, with specified treatments applied. Mark top and face of material.
   2. Mesh Top: Not less than 10 inches square.
   3. Curtain Track: Not less than 10 inches long.
F. Curtain and Track Schedule: Use same designations indicated on Drawings.

1.3 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: For curtains, track, and hardware to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Curtains: Provide curtain fabrics with the following characteristics:
   1. Launderable to a temperature of not less than 160 deg F.
   2. Flame resistant and identical to those that have passed NFPA 701 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.
a. Identify fabrics with appropriate markings of a qualified testing agency.

2.2 CURTAIN SUPPORT SYSTEMS
A. Extruded-Aluminum Curtain Track: Not less than 1-1/4 inches wide by 3/4 inch high; with 0.050-inch minimum wall thickness.
   2. Finish: Satin anodized.
B. Curtain Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.
C. Curtain Carriers: Two nylon rollers and nylon axle with aluminum hook.
D. Exposed Fasteners: Stainless steel.
E. Concealed Fasteners: Hot-dip galvanized.

2.3 CURTAINS
A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   2. General Cubicle Co. Inc.; “6062” track + “1062N” carrier with ball chain hook.
   3. Imperial Fastener Co.; “IFC 98” track + “IFC 100” carrier with ball chain hook.
B. Cubicle Curtain Fabric: Curtain manufacturer's standard, 100 percent polyester; inherently and permanently flame resistant, stain resistant, and antimicrobial.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. "Avora FR" by INVISTA
      b. "Trevira CS" by Trevira.
   2. Pattern: As selected by Architect from manufacturer's full range.
   3. Color: As selected by Architect from manufacturer's full range.
C. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 inches o.c.; machined into top hem.
D. Mesh Top: Not less than 20-inch-high mesh top of No. 50 nylon mesh.
E. Beaded-Chain Curtain Drop: 6 inches long; nickel-plated steel with aluminum hook.

2.4 CURTAIN FABRICATION
A. Fabricate curtains as follows:
   1. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than 12 inches added fullness.
   2. Length: Equal to floor-to-ceiling height, minus depth of track and carrier at top, and minus clearance above the finished floor as follows:
      a. Cubicle Curtains: 15 inches.
3. Mesh Top: Top hem of mesh not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double lockstitched. Double lockstitch bottom of mesh directly to 1/2-inch triple thickness, top hem of curtain fabric.

4. Bottom Hem: Not less than 1 inch and not more than 1-1/2 inches wide, double thickness and double lockstitched.

5. Side Hems: Not less than 1/2 inch and not more than 1-1/4 inches wide, with double turned edges, and single lockstitched.

B. Vertical Seams: Not less than 1/2 inch wide, double turned and double stitched.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. General: Install tracks level and plumb, according to manufacturer's written instructions.

B. Up to 20 feet in length, provide track fabricated from single, continuous length.

1. Curtain Track Mounting: Surface.

C. Surface-Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer. Fasten tracks to structure at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:

1. Mechanically fasten to suspended ceiling grid with screws.

D. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.

E. Curtain Carriers: Provide curtain carriers adequate for 6-inch spacing along full length of curtain plus an additional carrier.

F. Curtains: Hang curtains on each curtain track.

END OF SECTION 102123
SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product Data: For each type of product indicated. Include rating and classification, material
descriptions, dimensions of individual components and profiles, and finishes for fire
extinguisher and mounting brackets.

1.3 INFORMATIONAL SUBMITTALS
   A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.5 QUALITY ASSURANCE
   A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single
manufacturer.

1.6 COORDINATION
   A. Coordinate type and capacity of fire extinguishers with existing fire extinguisher cabinets to
ensure fit and function.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering
products that may be incorporated into the Work include, but are not limited to, the following:
   1. Portable Fire Extinguishers:
      a. Amerex Corporation.
      b. Ansul, Incorporated.
      c. Babcock-Davis.
      d. Badger Fire Protection.
      e. Buckeye Fire Equipment Company.
      g. J.L. Industries, Inc.
      h. Kidde; Div. of United Technologies Corp.
2.2 PORTABLE FIRE EXTINGUISHERS

A. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb nominal capacity, in enameled-steel container.

B. Wet-Chemical Type (Kitchen Area): UL-rated K, 1.6-gal. nominal capacity, with potassium acetate, potassium citrate or potassium carbonate-based chemical in stainless-steel container; with pressure-indicating gage.
   1. Ansul Incorporated; “K-Guard Model K01-2”.
   2. J.L. Industries, Inc; “Saturn 15”.
   3. Larsen’s Manufacturing Company; “WC-6L”.
   4. Potter-Roemer; Div. of Smith Industries, Inc; “Model 3260”.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish. Brackets shall be compatible with extinguishers.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
   1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

2.4 COLORS AND TEXTURES

A. Colors and Textures: As selected by Architect from manufacturer's full range for these characteristics.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing fire-protection specialties.

B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
   1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
   2. Fasten cabinets to structure, square and plumb.
3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust cabinet doors that do not swing or operate freely.

B. Refinish or replace cabinets and doors damaged during installation.

C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

D. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416
SECTION 11063 - STAGE CURTAINS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Batten: Steel pipe supporting curtain by means of cables or chains from overhead structural support.

B. Overlap: Track that extends beyond curtain centerline to ensure closure of bi-parting curtain.

C. Rigging: General term for hardware used to move scenery, lights, or curtains on or over the stage.

D. Scrim: Loosely woven fabric curtain that appears opaque when lit from the front and transparent when backlit.

E. Trim: Adjustment of height or level of curtain or equipment.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide rigging capable of withstanding the effects of the following design loads and the weight of stage curtains.

1. Design Loads: As indicated.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for stage curtains. Include plans, elevations, sections, details, attachments to other work, and the following:

1. Operating clearances.
2. Requirements for supporting curtains, track, and equipment. Verify capacity of each track and rigging component to support loads.

C. Samples for Verification: For each type of fabric from dye lot to be used for the Work, with specified treatments applied, and showing complete pattern and texture repeat, if any. Mark top and face of fabric. Prepare Samples of size indicated below.

1. Size: Not less than 12 inches square.

D. Product Certificates: For each type of product and fabric, signed by product manufacturer.
1. Fabric: Give name of flame-retardant chemical used, identification of applicator, treatment method, application date, allowable life span for treatment, and details of any restrictions and limitations.

2. Rigging: Suspended battens and tracks comply with requirements.

E. Qualification Data: For Installer. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Maintenance Data: For stage curtains and rigging to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

H. Sustainable Design Submittal:
   1. Refer to Division 1 Section “Sustainable Design Requirements.”

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual experienced in installing stage curtains and rigging similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Fire-Test-Response Characteristics: Provide stage curtains with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or a testing and inspecting agency acceptable to authorities having jurisdiction.
   2. Permanently attach label to each fabric of curtain assembly indicating whether fabric is inherently and permanently flame resistant or treated with flame-retardant chemicals, and whether it will require retreatment after designated time period or cleaning.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify stage-curtain openings and the dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 WARRANTY

A. Special Warranty for Rigging Equipment: Manufacturer's standard form in which manufacturer agrees to repair or replace components of rigging equipment that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to faulty operation of rigging equipment.

B. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CURTAINS

A. Provide curtains as indicated on the drawings.

2.2 CURTAIN FABRICS

A. General: Provide fabrics inherently and permanently flame resistant to comply with requirements indicated. Provide fabrics from the same dye lot.

B. Polyester Velour: Napped fabric of 100 percent polyester weighing not less than 23 oz./linear yard, with pile height approximately 75 mils; inherently and permanently flame resistant; 54-inch minimum width.

1. Basis-of-Design Products: Provide KM Fabric, Inc. or an approved equivalent from the listed manufacturer. Refer to Interior Color Schedule on Drawing A3.0.2 for the indicated KM Fabric, Inc. patterns and colors. Manufacturer indicated will be acceptable subject to exactly matching the selected patterns and colors indicated in the Color Schedule.

a. J. L. de Ball America, Inc.

2. Colors, Textures, and Patterns: Refer to Color Schedule on Drawing A3.0.1.

C. Lining: Yarn-dyed denim cloth of 100 percent cotton; woven in a warp-faced twill; 54-inch minimum width.

D. Polyester: Woven fabric of 100 percent polyester yarn weighing not less than 13 oz./linear yard; inherently and permanently flame resistant; 54-inch minimum width.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dazian; PD Cloth.
c. Rose Brand; Cyc Cloth.
d. Valley Forge Fabrics, Inc.; Wiz Key.

2. Colors, Textures, and Patterns: As selected by Architect from manufacturer's full range.


1. Fabric: 100 percent polyester weighing not less than 11.75 oz./linear yard; inherently and permanently flame resistant; 106-inch minimum width.

2. Color: As selected by Architect from manufacturer's full range.
2.3 CURTAIN FABRICATION

A. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on curtain not visible to audience. Provide vertical seams, unless otherwise indicated. Arrange vertical seams so they do not fall on faces of pleats. Do not use fabric cuts less than one-half width.

1. Vertical Hems: Provide vertical hems not less than 2 inches wide, and not less than 4 inches wide at borders, valance, and tormentors, with not less than a 1-inch tuck, and machine-sewn with no selvage material visible from front of curtain. Sew open ends of hems closed.

2. Leading Edge Turnbacks: Provide turnbacks formed by folding not less than 12 inches of face fabric back, with not less than a 1-inch tuck, and secured by sewing turnbacks vertically.

3. Top Hems: Reinforce top hems by double-stitching 3-1/2-inch-wide, heavy jute webbing to top edge with not less than 2 inches of face fabric turned under.

4. Pleats: Provide 50 percent fullness in curtains, exclusive of turnbacks and hems, by sewing additional material into 3-inch double-stitched box pleats spaced at 12 inches o.c. along top hem reinforcement.

5. Grommets: Brass, No. 3, centered on each box pleat and 1 inch from corner of curtain, for snaps or S-hooks.

   a. For black curtains, provide brass or aluminum grommets with black finish.

6. Bottom Hems:

   a. For curtains that do not hang to the floor, provide hems not less than 3 inches deep with 3/4-inch weight tape.

   b. For floor-length curtains, provide hems not less than 6 inches deep with separate, interior, 100 percent cotton, heavy canvas chain pocket equipped with proof coil chain. Stitch chain pockets so chain will ride 2 inches above finished bottom edge of curtain.

      1) Proof Coil Chain: Grade 30, No. 8, zinc plated, 3/16 inch, ASTM A 413/A 413M.


8. Lining: Provide lining for each curtain in same fullness as face fabric, and finished 2 inches shorter than face fabric. Attach lining to face fabric along bottom and side seams with 4-inch-long strips of heavy woven cotton tape.

B. Sky Drop: Fabricate from muslin fabric, sewn flat with either horizontal or vertical seams to suit Project, and selvage to the rear. Provide 6-inch pipe pocket at bottom with a 6-inch flap of same fabric in front of pocket. Provide double-stitched, 3-1/2-inch jute webbing at top with not less than No. 2 brass grommets spaced at 12 inches o.c. and 1 inch from corner of curtain. Provide not less than a 2-inch double-folded side hem and a 4-inch bottom hem.

C. Tie Lines: Braided soft cotton, black or white to best match curtain; not less than 5/8 inch wide by 36 inches long.
2.4 RIGGING

A. Curtain Battens: Fabricate battens from steel pipe with a minimum number of joints. As necessary for required lengths, connect pipe with a drive-fit pipe sleeve not less than 18 inches long, and secure with four flush rivets, plug welds, threaded couplings, or another equally secure method. Shop-paint completed pipe battens with black paint and with 1-inch-wide yellow stripe at the center of each batten.

1. Steel Pipe: ASTM A 53/A 53M, Grade A, standard weight (Schedule 40), black, 1-1/2-inch nominal diameter, unless otherwise indicated.

B. S-Hooks: Track manufacturer's heavy-duty plated-wire hooks.

C. Snap Hooks: Track manufacturer's heavy-duty hooks.

D. Supports, Clamps, and Anchors: Sheet steel in manufacturer's standard thicknesses, galvanized after fabrication according to ASTM A 153/A 153M, Class B.

E. Trim and Support Cable: 1/4-inch-diameter, 7x19 galvanized steel aircraft cable with a breaking strength of 7000 lb. Provide fittings complying with cable manufacturer's printed recommendations for size, number, and method of installation, including a drop-forged galvanized turnbuckle to allow for leveling.

F. Trim and Support Chain: Grade 80 hardened alloy steel chain rated for overhead lifting, ASTM A 391/A 391M.

G. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard corrosion-resistant units.

H. Steel Track: Fabricate of roll-formed, galvanized, commercial-quality, zinc-coated steel sheet; complying with ASTM A 653/A 653M, G60 (Z180) coating designation, with continuous bottom slot, and with each half of track in one continuous piece.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Automatic Devices Company.
   b. H & H Specialties Inc., design standard.
      1) Curtains over 18’ tall shall utilize H&H Specialties 400 series track and components or pre-approved equal.
      2) Curtains under 18’ tall shall utilize H&H Specialties 100 series track with 200 series components or pre-approved equals.
      3) Lightweight curtains shall utilize H&H Specialties 116 series track and components or pre-approved equals.
      4) Curved curtains shall utilized H&H Specialties 300 series track and components or pre-approved equal.

2. Minimum Base-Metal Thickness: Not less than 0.0677 inch.
2.5 STEEL CURTAIN-TRACK FABRICATION

A. Medium-Duty Track System: Equip track with adjustable, single- and double-end pulley and floor blocks containing guarded ball-bearing wheels. Provide single curtain carriers of plated steel with a pair of nylon wheels riveted parallel to body. Provide one master carrier, for each leading curtain edge, of plated steel with two pairs of nylon wheels and with two line clamps per carrier. Equip carriers with plated-steel swivel eye for attaching curtain snap or S-hook. Provide end stops for track and an adjustable floor block designed for maintaining proper tension on 1/4-inch stretch-resistant operating cord consisting of braided synthetic-fiber jacket over solid, synthetic-fiber, linear, center filaments.

1. Operating Line: Manufacturer's standard 3/8-inch stretch-resistant operating cord consisting of braided synthetic-fiber jacket over solid, synthetic-fiber, linear, center filaments.
2. Operating Line: Manufacturer's standard 3/16-inch stretch-resistant operating cable consisting of braided synthetic-fiber jacket over galvanized wire-center cable.
3. Track Lap Clamp: Metal to match track channel for attaching double-sectioned track at center overlap.
4. Curtain Carriers: For track spaced at 12 inches o.c.
5. Fold Guide: Equip carriers with rear-fold or backpack guide and rubber spacers to permit onstage curtain folding, sized for use with operating line if any.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage-curtain work. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install stage-curtain system according to track manufacturer's and curtain fabricator's printed instructions.

3.3 BATTEN INSTALLATION

A. Install battens by suspending at heights indicated with trim and support cable or chain spaced to support load, but do not exceed 10 feet o.c.
1. Cable: Secure cables either directly to structures or to inserts, eye screws, or other devices that are secure and appropriate to substrate and that will not deteriorate or fail with age or elevated temperatures. Attach other cable end to pipe clamps with turnbuckles, moused or fixed with nuts after adjustment, to prevent loosening.


3.4 TRACK INSTALLATION

A. Beam-Mounted Tracks: Install tracks by suspending from manufacturer's special beam clamps securely mounted to I-beam structure at spacing, according to manufacturer's printed instructions.

B. Wall-Mounted Tracks: Install tracks by suspending from manufacturer's special bracket clamps securely mounted to wall construction at spacing, according to manufacturer's printed instructions.

C. Batten-Hung Tracks: Install track by suspending from pipe batten with manufacturer's track clamp hangers attached to batten pipe clamps at spacing, according to manufacturer's printed instructions.

D. Spacing: Do not exceed the following dimensions between supports:
   1. Medium-Duty Track: 48 inches.

E. Install track for center-parting curtains with not less than 24-inch overlap of track sections at center, supported by special lap clamps.

3.5 CURTAIN INSTALLATION

A. Track Hung: Secure curtains to track carriers with track manufacturer's special heavy-duty S-hooks or snap hooks.

B. Batten Hung: Secure curtains to pipe battens with trim and support cable tie lines or chains.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to test system and to train Owner's personnel to rig, adjust, operate, and maintain stage curtains, and tracks. Refer to Division 01 for requirements.

END OF SECTION 11063
SECTION 116623 - GYMNASIUM EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product Data: For each type of product indicated.
      1. If applicable, include assembly, disassembly, and storage instructions for removable
         equipment.
   B. Shop Drawings: For gymnasium equipment. Include plans, elevations, sections, details,
      attachments to other work, and the following:
      1. Transport and storage accessories for portable equipment.
   C. Samples: For the following products:
      1. Pad Fabric: Not less than 3 inches square, with specified treatments applied. Mark face
         of material.
   D. Product Certificates: For each type of gymnasium equipment, signed by product manufacturer.
   E. Operation and Maintenance Data: For gymnasium equipment to include in emergency, operation,
      and maintenance manuals.
   F. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE
   A. Source Limitations: Obtain each type of gymnasium equipment through one source from a single
      manufacturer.

1.4 WARRANTY
   A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or
      replace components of gymnasium equipment that fail in materials or workmanship within
      specified warranty period, commencing from date of Substantial Completion.
      1. Portable Basketball Backstops, backboards and goals: Provide manufacturer's minimum
         10-year warranty against defects in manufacture and materials covering full material
         replacement cost. (Porter 735 series)

PART 2 - PRODUCTS

2.1 MATERIALS
   A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
      1. Extruded Bars, Profiles, and Tubes: ASTM B 221.
   B. Steel: Comply with the following:
      1. Steel Plates, Shapes, and Bars: ASTM A 36.
2. Steel Tubing: ASTM A 500 or ASTM A 513, cold formed.
3. Steel Sheet: ASTM A 1011.

C. Support Cable: 1/4-inch diameter, 7x19 galvanized steel aircraft cable with a breaking strength of 7000 lb. Provide fittings complying with cable manufacturer's written instructions for size, number, and method of installation.

D. Castings and Hangers: Malleable iron, ASTM A 47, grade required for structural loading.

E. Softwood Plywood: DOC PS 1, exterior.

F. Anchors, Fasteners, Fittings and Hardware: Manufacturer's standard corrosion-resistant or non-corrodible units; concealed; tamperproof, vandal- and theft-resistant design.

2.2 BASKETBALL EQUIPMENT

A. Basis-of-Design Products: Subject to compliance with requirements, provide the Porter Athletic Equipment Company products indicated or comparable products by one of the following:
1. Draper Inc.
2. Jaypro Sports.

B. Protruding fasteners or exposed bolt heads on front face of backboards are not permitted.

C. Basketball Backstop:
1. Portable Height-Adjustable Type: Manufacturer's standard assembly for portable height-adjustable backstop, with hardware and fittings to permit folding. Design is based on Porter Model 725050.
2. Framing: Steel pipe, tubing and shapes. Design framing to minimize vibration during play.
   a. Finish: Manufacturer's standard powdercoat finish. Color to be selected by Architect from manufacturer’s standard colors.
3. Goal Height Adjuster: Adjustable from 8 to 10 feet with a counterbalanced-type multiple tension spring operating system, with goal locking in playing position (8-feet, 9-feet or 10-feet) by means of an integral, telescoping diagonal brace system equipped with a positive pin and pressure lock arrangement. Through-pin mechanism designed to accept provided padlock.
4. Protective Padding: Provide protective padding on front vertical support and on front and sides of base. Padding shall consist of minimum 2-inch thick shock absorbing foam, covered with 19-ounce per square yard, vinyl coated polyester scrim material with rigid, solid core plywood backing secured to backstop frame. Entire top of base section shall be enclosed by matching vinyl covered enclosure.
   a. Color: Selected by Architect from manufacturer’s full range.

D. Basketball Backboard: Design standard is Porter #00208.
1. Shape and Size: Rectangular, 72 by 42 inches width by height.
2. Backboard Material: With predrilled holes or preset inserts for mounting goals, and as follows:
   a. Glass: Not less than 1/2-inch-thick, transparent tempered glass complying with ASTM C 1048 Kind FT (fully tempered) and with impact testing requirements in 16 CFR 1201 Category II or ANSI Z97.1 Class A for safety glazing. Provide glass with impact-absorbing resilient rubber or PVC gasket around perimeter in a fully welded, painted steel tube or brushed-natural-finish, extruded-aluminum tube frame,
with steel subframe, reinforcement, bracing, and mounting slots for mounting backboard frame to backboard support framing. Provide limited lifetime warranty.

1) Direct Mount: Designed for mounting backboard frame to center mast to maximize relief of stresses on backboard frame and glass.

3. Target Area and Border Markings (Glass): Permanently etched in white color, marked in manufacturer's standard pattern and stripe width.

E. Backboard Safety Pads: Designed for backboard thickness indicated and extending continuously along bottom and up sides of backboard and over goal mounting and backboard supports as per manufacturer's standard design. Design standard is Porter #00326.
   a. Attachment: Bolt-on.
   b. Color: As selected by Architect from manufacturer's full range.

F. Basketball Goals: Complete with flanges, braces, attachment plate, and evenly spaced loops welded around underside of ring.
   1. Type: Movable, breakaway design with breakaway mechanism and rebound characteristics identical to those of fixed, non-movable ring complete with net and mounting hardware. Design standard is Porter #236054.

2.3 SAFETY PADS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Draper Inc.
   2. Jaypro Sports.
   3. Porter Athletic Equipment Company. (00560-00 is design standard)

B. Safety Pad Surface-Burning Characteristics: ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

C. Pad Coverings: Provide safety pad fabric covering fabricated from puncture- and tear-resistant, not less than 14-oz./sq. yd PVC-coated polyester or nylon-reinforced PVC fabric fungicide-treated for mildew resistance; with surface-burning characteristics indicated.

D. Wall Safety Pads: Padded wall wainscot panels designed to be attached in a continuous row; consisting of fill laminated to backer board with visible surfaces fully covered by seamless fabric covering, free of sag and wrinkles and firmly attached to back of backer board.
   1. Backer Board: Not less than 7/16-inch- thick plywood, mat formed, or composite panel.
   2. Fill: Multiple-impact-resistant foam 2-inch- thick bonded polyurethane, 6.0 pcf density.
   3. Fire-Resistive Fill: Multiple-impact-resistant foam not less than [2-inch- thick fire-resistant neoprene, 6.0-lb/cu. ft. density].
   4. Size: Each panel section, 24 inches wide by not less than 72 inches long.
   5. Number of Panel Sections: As indicated.
   7. Fabric Covering Color: One color selected by Architect from manufacturer's full range.
   8. Molded Inserts of Wall Pad Cutouts: Provide molded flame-retardant rubber inserts for finish trim of field cutouts in panels, secure to backside of wall panels with staples. Design standard is Porter 00341-series for single gang boxes and 00342-series for two-gang boxes.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
   A. General: Comply with manufacturer's written installation instructions and competition rules indicated for each type of gymnasium equipment. Complete equipment field assembly, where required.
   B. Unless otherwise indicated, install gymnasium equipment after other finishing operations, including painting, have been completed.
   C. Removable Gymnasium Equipment and Components: Assemble in place to verify that equipment and components are complete and in proper working order. Instruct Owner's designated personnel in properly handling, assembling, adjusting, disassembling, transporting, storing, and maintaining units. Disassemble removable gymnasium equipment after assembled configuration has been approved by Owner, and store units in location indicated on Drawings.
      1. Turn loose items of equipment over to the Owner after unpacking and checking for proper type, material, size, quantity, and fit of each accessory. No claim may be made for items turned over to the Owner without obtaining a receipt.

3.2 ADJUSTING
   A. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and moving parts.

3.3 CLEANING
   A. After completing gymnasium equipment installation, inspect components. Remove spots, dirt, and debris and touch up damaged shop-applied finishes per manufacturer's written instructions.
   B. Replace gymnasium equipment and finishes that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

3.4 DEMONSTRATION
   A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gymnasium equipment.

END OF SECTION 116623
SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds.
   C. Samples for Initial Selection: For each type and color of horizontal louver blind indicated.
      1. Include similar Samples of accessories involving color selection.
   D. Samples for Verification: For each type and color of horizontal louver blind indicated.
      1. Slat: Not less than 12 inches long.
      2. Tapes: Full width, not less than 6 inches long.
      3. Horizontal Louver Blind: Full-size unit, not less than 16 inches wide by 24 inches long.
   E. Product Certificates: For each type of horizontal louver blind, signed by product manufacturer.
   F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of horizontal louver blind.
   G. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.3 QUALITY ASSURANCE
   A. Source Limitations: Obtain horizontal louver blinds through one source from a single manufacturer.
   B. Product Standard: Provide horizontal louver blinds complying with WCSC A 100.1.

1.4 DELIVERY, STORAGE, AND HANDLING
   A. Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.5 PROJECT CONDITIONS
   A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and dirty finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
   B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Horizontal Louver Blinds: Before installation begins, for each size, color, texture, pattern, and gloss indicated, full-size units equal to 5 percent of amount installed.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Hunter Douglas; Model CD80.
2. Levolor, a Newell Rubbermaid Company; Mark I Dustguard.
3. Springs Window Fashions Division, Inc.; S3000.

B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.

1. Width: 1 inch.
2. Thickness: Not less than 0.008 inch.
3. Spacing: 0.79 inch.
4. Finish: One color.
   a. Ionized Coating: Antistatic, dust-repellent, baked polyester finish.

C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and end plugs and the following:

1. Capacity: One blind per headrail.
2. Light-blocking lower back lip.
3. Tilt limiter with preselected degree settings.

D. Bottom Rail: Formed-steel or extruded-aluminum tube, with plastic or metal capped ends top contoured to match crowned shape of slat and bottom contoured for minimizing light gaps; with enclosed ladders and tapes to prevent contact with sill.

E. Maximum Light-Blocking Blinds: Designed for eliminating all visible light gaps if slats are tilted closed; with tight tape spacing indicated and slats with minimal-sized rout holes for ladders hidden and placed near back edge for maximum slat overlap; with headrail and bottom rail extended and formed for light-tight joints between rail and adjacent slats or construction.

1. Finish: Match color, texture, pattern, and gloss of slats.

F. Ladders: Evenly spaced to prevent long-term slat sag.

1. For Blinds with Nominal Slat Width 1 Inch or Less: Braided string.

G. Lift Cords: Manufacturer's standard.

H. Tilt Control: Enclosed worm-gear mechanism, slip clutch or detachable wand preventing over rotation, and linkage rod, and the following:

2. Length of Tilt Control: Full length of blind.
3. Tilt: Full.
I. Lift Operation: Manual, top-locking cord lock; locks pull cord to stop blind in either fully opened or fully closed position only and is equipped with a ring pull not more than 4 inches long.
   1. Tilt-Control and Cord-Lock Position: Tilter at left, cordlock at right, to suit project conditions; Tilter at right, cordlock at left, to suit project conditions, unless otherwise indicated.

J. Valance: Manufacturer's standard.
   1. Finish Color Characteristics: Match color, texture, pattern, and gloss of slats.

K. Mounting: As indicated, permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.
   1. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.

L. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.

M. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.

N. Colors, Textures, Patterns, and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.
      1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
   A. Install horizontal louver blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior slat edges in any position are not closer than 1 inch (25 mm) to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware if any.

3.3 ADJUSTING
   A. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free of binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION
   A. Clean horizontal louver blind surfaces after installation, according to manufacturer's written instructions.
   B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
   C. Replace damaged horizontal louver blinds that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.
3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems. Refer to Division 1 Section “Demonstration and Training.”

END OF SECTION 122113
SECTION 123216 - MANUFACTURED PLASTIC-LAMINATE-FACED CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Provisions of the Contract and of the Contract Documents apply to this Section.

1.2 SUMMARY
A. This Section includes the following:
   2. Wood-faced cabinets with plastic-laminate doors and drawer fronts.
   3. Wall shelving.
B. Related Sections include the following:
   1. Division 6 Section “Rough Carpentry” for wood blocking for anchoring casework.
   2. Division 6 Section “Interior Architectural Woodwork.”
   3. Division 9 Section “Resilient Base and Accessories” for resilient base applied to casework.

1.3 DEFINITIONS
A. Open Interiors: Any open storage unit without solid door or drawer fronts and units with full glass insert doors and/or acrylic doors.
B. Closed Interiors: Any closed storage unit behind solid door or drawer fronts, sliding solid doors.
C. Exposed Ends: Any storage unit exterior side surface that is visible after installation. (REPAIR ANY EXPOSED SURFACE THAT IS DAMAGED, VERIFY AND QUANTIFY IN FIELD).
D. Other Exposed Surfaces: Faces of doors and drawers when closed, and tops of cabinets less than 72 inches above furnished floor, edge-banding. (REPAIR ANY OTHER EXPOSED SURFACE THAT IS DAMAGED, VERIFY AND QUANTIFY IN FIELD).
E. Semi-Exposed Surfaces: Interior surfaces which are visible and tops of cabinets 72 inches or more above finished floor. (REPAIR ANY SEMI-EXPOSED SURFACE THAT IS DAMAGED, VERIFY AND QUANTIFY IN FIELD).
F. Concealed Surfaces: Any surface not visible after installation.
G. Caulking: Provide and or repair any caulking around plumbing elements. (VERIFY AND QUANTIFY CAULKING NEEDED IN FIELD).
H. Hinges: Provide and or repair hinges that are missing or broken. (VERIFY AND QUANTIFY HINGES IN FIELD).

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product indicated above.
B. Shop Drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.
C. Samples for Initial Selection: For cabinet finishes and for each type of top material indicated.
   1. PVC edge material.
   2. Exposed hardware finish color chart (epoxy and chrome finishes)
   3. Caulking
   4. Hinges

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE
A. Installer Qualifications: An authorized representative of institutional casework manufacturer for installation and maintenance.

1.7 FIELD CONDITIONS
A. Established Dimensions: Where providing and repairing items indicated in Section 1.3, establish dimensions for areas where work is required. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
B. Field Measurements: Where institutional casework is indicated to fit to other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Casework Manufacturers: Subject to compliance with all requirements, provide Plastic-Laminate-Faced Institutional Casework products by one of the following:
   3. Cleora Sterling Corp.
   4. TMI Systems Design Corp. www.tmisystems.com
   5. Stevens Industries, Inc. www.stevensadvantage.com
   6. Terrill Manufacturing Company, Inc.

2.2 MATERIALS
A. High Pressure Decorative Laminates: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
   1. Grades:
      b. High-pressure decorative laminate HGS (.048), NEMA Test LD 3-1995.
      c. High-pressure cabinet liner CLS (.020), NEMA Test LD 3-1995.
      d. High-pressure backer BKH (.048), (.028), NEMA Test LD3-1995.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
   a. Formica Corporation.
   b. Nevamar Company, LLC; Decorative Products Div.
   c. Wilsonart International; Div. of Premark International, Inc.

B. Edging Materials:
   1. 1mm edge banding (typical)
   2. 3mm PVC banding, machine profiled to 1/8-inch radius. (classrooms)

2.3 DESIGN, COLOR, AND FINISH

A. Design: Provide institutional casework of the following design:
   1. Flush overlay with wire pulls.

B. PVC Edging Materials: As selected by Architect from manufacturer's entire line of standard and custom colors.

2.4 CABINET FABRICATION

A. Plastic-Laminate-Faced Cabinet Construction:
   a. Exposed and semi exposed edges.
      1) Edging: 1mm PVC.
      2) Exposed Shelf Edging: 3mm PVC.
   b. Shelves: 3/4-inch- thick plywood or 1-inch- thick particleboard.
      1) Front edge: Minimum 1 mm PVC; concealed shelves.
      2) Front edge: 3 mm PVC; exposed shelves in open interiors only.
   c. Exposed ends: Faced with VGS high-pressure decorative laminate.

2. Door/Drawer Fronts:
   a. Core: 3/4-inch thick particleboard.
   b. Provide double doors in opening in excess of 24 inches wide.
   c. Faces: High-pressure laminate.
      1) Exterior: VGS High-pressure decorative laminate.
      2) Interior: High-pressure cabinet liner CLS.
   d. Door/drawer edges: 3mm PVC, external edges and outside corners machine profiled to 1/8-inch radius.

2.5 CASEWORK HARDWARE

A. Hardware, General: Provide manufacturer's standard epoxy powder-coated or chrome-plated finish, commercial-quality, heavy-duty hardware complying with requirements indicated.
   1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Butt Hinges: Epoxy powder-coated or chrome-plated finish, semi-concealed, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings, 2-3/4-inch overlay type with hospital tip. Provide 2 hinges for doors less than 48 inches high and 3 hinges for doors more than 48 inches high.
   1. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521.
C. Pulls: Door and drawer front pulls, are epoxy powder coated or satin chrome finish metal wire style, 96mm spacing on screws. Pull design shall comply with the Americans with Disability Act (ADA).

2.6 COUNTERTOPS

A. Countertops, General: Provide smooth, clean exposed tops and edges in uniform plane free of defects. Provide front and end overhang of 1 inch over base cabinets.

B. Plastic-Laminate Tops: Plastic-laminate sheet, shop bonded with water-resistant glue to both sides of 1-inch plywood or particleboard. Sand surfaces to which plastic laminate is to be bonded.
   1. Provide either built-up or one-piece countertop construction for minimum 1-inch deep front counter edge.
      a. 1-1/2-inch counter edge built-up of 3/4-inch core material, self-edged with plastic laminate.
      b. 1-1/8 inch thick core material (monolithic) and 3 mm PVC edge banding.
   2. Plastic-Laminate Type for Flat Tops: HGS. (.048-inch)
   3. Plastic-Laminate Type for Backing: BKL. (.028-inch)
   4. Provide 3-mm PVC edging on front edge of top, on top edges of backsplashes and end splashes, and on ends of tops and splashes. Machine profile edges and corners to 1/8-inch radius.

C. Caulking at Sinks: Use one of the following for countertops containing sinks. No exceptions:
   1. Provide and or repair caulking at sinks. Quantify in field, provide product data and full range of colors for architect to select from.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of institutional casework.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Condition casework to average prevailing humidity conditions in installation areas prior to installing.

3.3 CASEWORK INSTALLATION

A. Install plumb, level, and true; shim as required, using concealed shims. Where institutional casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

3.4 CLEANING AND PROTECTING

A. Repair or remove and replace defective work as directed on completion of installation.
B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

3.5 COLOR SELECTION

A. Laminate Color Selection:
   1. Select from the full range of Wilsonart, Nevamar, Pionite, and Formica stock color charts for cabinet faces, exposed ends, open interiors, and countertops. Thermally fused melamine laminates available in Frosty White, Light Beige, Dove Grey colors (matched to Wilsonart).

B. Hinge and Pull Color Selection:
   1. Select from your choice of stock colors (matched to Wilsonart) Frosty White, Light Beige, Dove Grey, Slate Grey, Black and Chrome

C. 1mm PVC Edge Banding Color Selection:
   1. Select from your choice of many 1mm PVC edgings available in a variety of solid, pattern and wood grains matching laminate colors.

D. 3mm PVC Edge Banding Color Selection:
   1. Select from manufacturer’s full range of available 3mm PVC stock colors (matched to Wilsonart laminates).

3.6 All specified or detailed work shall match existing unless otherwise specified or indicated in the contract documents. It is the responsibility of the contractor and sub-contractor to observe the project before bid and match all materials for species, grain, and overall appearance.

END OF SECTION 123216
ABATEMENT PROJECT SPECIFICATION

PATRICK HENRY SCHOOL AND RECREATION CENTER
4643 TANEY AVENUE
ALEXANDRIA, VA 22304

ECS PROJECT NO. 47:1664

FOR

MOSELEY ARCHITECTS

APRIL 27, 2016
ECS MID-ATLANTIC, LLC

April 27, 2016

Mr. William T. Brown, AIA  
Vice President  
Moseley Architects  
8001 Braddock Road, Suite 400  
Springfield, VA 22151  
bbrown@moseleyarchitects.com

ECS Project No. 47:1664

Reference: Abatement Project Specification, Patrick Henry School and Recreation Center, 4643 Taney Avenue, Alexandria, VA 22304

Dear Mr. Brown:

ECS Mid-Atlantic, LLC (ECS) is pleased to provide Moseley Architects with an abatement project specification for the above referenced building. This Specification is in general conformance with ECS Proposal No. 01:53136-EPR, dated January 6, 2016.

If there are questions regarding this Specification or need further information, please do not hesitate to contact us at (703) 471-8400.

Respectfully,

ECS MID-ATLANTIC, LLC

Diana D. Krass  Stephen R. Geraci
Senior Industrial Hygiene Manager  Environmental Regional Manager

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SECTION 13 28 00  
HAZARDOUS AND UNIVERSAL WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All applicable parts of DIVISION 1 – GENERAL REQUIREMENTS shall be included in and made a part of this Section.

1.2 WORK INCLUDED

A. This Section covers the demolition, use, handling, storage, transporting, accumulation and disposal or recycling of hazardous materials/substances that may be encountered within the scope of work by the Contractor during the course of the work. The Contractor is made aware by this Specification that hazardous materials/substances are regulated by several statutes and regulations and require special care. Work under this Section includes the proper removal, packaging, and recycling (or disposal where applicable) of the following:

<table>
<thead>
<tr>
<th>Fixture Type / Material</th>
<th>Estimated Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent Lamps</td>
<td>10,500 LF</td>
</tr>
<tr>
<td>Suspect PCB/DEHP-containing Lamp Ballasts</td>
<td>1,220 EA</td>
</tr>
<tr>
<td>High Intensity Discharge Lamps (HIDS)</td>
<td>46 EA</td>
</tr>
<tr>
<td>Compact Fluorescent Bulbs</td>
<td>20 EA</td>
</tr>
<tr>
<td>Fire Extinguisher</td>
<td>14 EA</td>
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<tr>
<td>Refrigerants*</td>
<td>7 EA</td>
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<tr>
<td>Air Handling Unit*</td>
<td>Unknown</td>
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<tr>
<td>Water Fountains*</td>
<td>Unknown</td>
</tr>
<tr>
<td>Fire Suppression System (Kitchen)</td>
<td>1 EA</td>
</tr>
<tr>
<td>Batteries/Smoke Detection Equipment</td>
<td>55 EA</td>
</tr>
</tbody>
</table>

Notes:  LF = Linear Feet; EA = Each

* The Contractor shall properly remove and recycle CFCs or other ozone depleting materials

In addition, to the universal waste materials referenced in the table above, ECS also observed the following miscellaneous materials that may require special handling and disposal during renovation and/or demolition activities:

- Yellow cabinet labeled flammable that contained maintenance and cleaning products in the boiler room;
- 55-gallon drum of SB-350 boiler treatment in boiler room;
- Multiple printer ink cartridges in main office;
- Multiple floor treatment containers in janitor’s closet.
Where possible, the Contractor shall recycle materials. If materials are to be recycled, the Contractor shall document proper documentation that the material has been received by a firm that can recycle the materials. Documentation also on the amount of material received by this vendor shall also be included.

CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXACT QUANTITIES, QUANTITIES PROVIDED ARE ESTIMATES ONLY. CONTRACTOR RESPONSIBLE FOR REMOVAL AND DISPOSAL OF ENTIRE QUANTITY OF MATERIALS LISTED IN SECTION 1.02.

1.3 RELATED WORK

A. Section 13282 Removal and Disposal of Asbestos-Containing Building Materials
B. Section 13283 Lead Control Procedures

1.4 CODES AND REGULATIONS

A. General Applicability of Codes and Regulations, Guidelines and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, guidelines 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. Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Designer harmless for failure to comply with any applicable work, safety, health or other regulation on the part of himself, his employees, or his subcontractors.

C. Federal Requirements: which govern hazardous material abatement work or hauling and packaging of hazardous waste materials include but are not limited to the following:

1. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, including but not limited to:
   - 29 CFR 1910-1990 - Occupational Safety and Health
   - 29 CFR 1910.134 - Respiratory Protection
   - 29 CFR 1910.145 - Specifications for Accident Prevention Signs and Tags
   - 29 CFR 1910.1200 - Hazardous Communication
   - 29 CFR 1926.55 - Gases, Vapors, Fumes, Dusts, and Mists
   - 29 CFR 1926 Subpart E - Personal Protective and Life Saving Equipment
2. EPA: U. S. Environmental Protection Agency, including but not limited to:
   40 CFR 61 - National Emissions Standards for Hazardous Air Pollutants
   40 CFR 9 & 82 - Protection of Stratospheric Zone (CFCs), Clear Air Act Amendments of 1990
   40 CFR 122 & 125 - National Pollutant Discharge Elimination System, Clean Water Act
   40 CFR 165 - Disposal and Storage of Pesticides and Pesticide Containers
   40 CFR Subchapter J, - Superfund, Emergency Planning, and Parts 300-373 Community Right-to-Know Programs
   40 CFR 700-799 - Toxic Substances Control Act (TSCA)

3. DOT: U. S. Department of Transportation, including but not limited to:
   49 CFR 100-180 - Department of Transportation

D. State Requirements: Abide by all state requirements which govern the management, packaging, salvaging, and recycling of hazardous and universal waste.

E. Local Requirements: Abide by all local requirements which govern the management, packaging, salvaging, and recycling of hazardous and universal waste.

F. Building Codes: Comply with applicable provision of state and/or local building codes that govern any part of the work.

G. Reference Standards: Comply with the following applicable reference standards:
   1. American National Standards Institute (ANSI):
      Z288.2-1992 - Standard for Respiratory Protection

1.5 WORKER PROTECTION

A. Worker Training: The Contractor must ensure that every person is trained pursuant to the directions in 49 CFR 172.202 who:
   1. Prepares hazardous materials for packaging, salvaging, and recycling;
   2. Handles, loads, unloads or moves hazardous materials;
   3. Fills out forms for the transportation of hazardous materials; or
   4. Is in any way responsible or accountable for any hazardous materials at the site.
B. Contractor personnel must possess all personal licenses, permits, and certifications required to perform their duties.

1.6 SUBMITTALS

Before the start of work, submit the following to the Owner’s Representative for review. Do not start work until these submittals are returned with Owner’s Representative’s action stamp indicating that the submittal is returned for unrestricted use.

A. Copy of licenses for waste hauler.

B. U.S. EPA Identification Number/Generator.

C. Copy of EPA “Notice of Hazardous Waste Activity” form.

D. Copy of forms required by local agencies.

E. Sample of disposal label to be used.

F. Emergency Response Plan: Provide an Emergency Response Plan addressing the steps that will be taken in the event of a hazardous material spill or leak including name, emergency phone numbers, and notification of the closest hazardous material emergency response unit; reporting procedures; and spill controls.

PART 2 - PRODUCTS

2.1 PROTECTIVE CLOTHING

A. Coveralls: Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the work area. Provide a sufficient number for all required changes, for all workers in the work area. Dispose of coveralls as contaminated waste at the end of each day.

B. Hard Hats: Provide head protectives (hard hats) as required by OSHA for all workers, and provide four spares for use by Owner’s Representative, Project Monitor and Owner. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of type with plastic strap type suspension. Require hats to remain in the work area throughout the work. Thoroughly clean and decontaminate hats before removing them from work area at the end of the project.

C. Gloves: Provide work gloves to all workers and require that they be worn at all times in the work area. Do not remove gloves from Work Area. Dispose of as clothing waste at the end of the work.

2.2 WASHING FACILITIES

A. Provide washing facilities to be used by all workers when exiting the work area.
1. Provide temporary sink with hot and cold water supply. Filter all waste water.

2. Supply a sufficient quantity of soap and towels for the workers and authorized visitors.

2.3 EYEWASH STATION

Suitable facilities for flushing of the eyes shall be provided within the work area for immediate emergency use.

2.4 FIRST AID

Comply with governing regulations and recognized recommendations within the construction industry.

2.5 FIRE EXTINGUISHERS

Provide Type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type "ABC" dry chemical extinguishers, or a combination of several.

2.6 DISPOSAL BAGS

Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags.

2.7 SMALL QUANTITY STORAGE CONTAINERS

Provide five gallon or less capacity containers for small quantity waste segregation, manufactured with structurally durable materials compatible with the hazardous waste type(s) used.

2.8 DOT HAZARDOUS WASTE DISPOSAL DRUMS

Provide DOT approved Open-Top Drums (55 gallon) in accordance with DOT regulations title 49 CFR Parts 173, 178, and 179.

2.9 DOT HAZARDOUS WASTE LABELS

Provide Hazardous Waste Labels in accordance with DOT regulations Title 49 CFR parts 173, 178, and 179.
PART 3 - EXECUTION

3.1 PROTECTION

A. **Storage**: The Contractor shall provide a temporary construction trailer or other secured area as a storage area for tools, equipment and supplies. Waste generated during abatement shall be stored in a separate area provided by the Contractor.

B. **Electrical Service**:

1. **General**: Provide a weatherproof, grounded, temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work. The Contractor shall deactivate and lock out electrical service to the work areas prior to the removal of light fixtures from the ceiling system. The lock out of electrical equipment shall be performed in accordance with 29 CFR 1910.147 “Control of Hazardous Energy (Lockout/Tagout)”.

2. **Lockout**: Lockout all existing power to or through the work area. Unless specifically noted otherwise existing power and lighting circuits to the work area are not to be used. All power and lighting to the Work Area is to be provided from outside of the work area.

C. **Securing Work Area**: Secure work area from access by public, occupants, staff or users of the building. Accomplish this where possible, by locking doors, windows, or other means of access to the area.

D. **Demarcation of Work Area**: Provide warning signs and barrier tape to establish a restricted access work area.

E. **Housekeeping**: Maintain all surfaces within the Work Area free of accumulations of debris to prevent dispersion and contamination. Give meticulous attention to restricting the spread of debris, keep waste from being distributed over the general area or to other areas in the building. Post appropriate hazard warning signs. Equip personnel engaged in cleaning up scrap and waste with appropriate personal protective clothing.

3.2 REMOVAL

A. **Removal of components/materials**: The Contractor shall segregate all materials containing mercury and prevent mercury from being combined with other liquid or solid hazardous or non-hazardous materials.

1. The Contractor shall remove the fluorescent lamps from each fixture and place them in a cardboard shipping container or similar carton. Care is to be exercised so as to not break the lamps.
2. Broken fluorescent bulbs must be handled, stored, labeled and disposed as hazardous waste unless TCLP analysis determines the waste is characterized as non-hazardous. A waste determination shall be the responsibility of the contractor.

2. Mercury-containing materials shall be stored in appropriate containers that are clearly labeled to identify the contents. Appropriate containers are those that will not deteriorate or react with mercury or allow mercury to leak into the environment during normal use handling, and disposal procedures. Regulations for containing and labeling mercury and mercury-containing materials can be found in 49 CFR 172.101.

B. Removal of components containing PCB’s:

1. The Contractor shall remove the light fixtures from the ceiling system and access the ballasts in each fixture. Light ballast that do not have a non-PCB label shall be treated as suspect PCB containing. All ballasts shall be treated as DEHP-containing.

2. The Contractor shall provide DOT and EPA approved 55 gallon steel drums and labels for the packaging of light ballasts. A minimum of two layers of six millimeter polyethylene sheeting shall be placed on the floor beneath the disposal drums. Fluorescent light ballasts and HID capacitors shall be containerized separately.

3. The Contractor shall place all unlabeled light ballasts in properly labeled steel drums. No more than 200 ballasts are to be placed in each 55 gallon steel drum.

4. If the Contractor encounters any ballast which has leaked, the Contractor shall remove the contaminated components of the light fixture (if any) and wrap them in two layers of six millimeter polyethylene sheeting. The contaminated components or fixture shall then be placed in the labeled steel drum for proper disposal.

C. Removal of lead acid emergency exit light batteries and other materials:

1. The Contractor shall properly remove and dispose of all other materials identified.

2. The Contractor shall provide approved labeled containers for the recycling or disposal of these materials.

3. If the Contractor encounters any battery which has leaked, the Contractor shall remove the contaminated components of the fixture (if any) and wrap them in 2 layers of 6-millimeter polyethylene sheeting. The contaminated components or fixture shall then be placed in the container for proper disposal.

3.3 PRECAUTIONS AND HANDLING SPILLS

A. Personal Protective Equipment (PPE) shall be worn when working with PCB/DEHP ballasts and mercury containing equipment. When handling ballast and/or components contaminated by a leaking ballast, and when cleaning up small spillage, workers shall wear acid resistant
gloves. When a ballast is being removed from equipment, safety glasses should also be worn.

B. When leaking ballasts come into contact with heat sources, the hazardous material may vaporize. Inhalation of these vapors may cause respiratory problems; therefore, the work area shall be ventilated and proper respiratory protection shall be provide to the worker by the Contractor.

C. If liquids should get into the eyes, the eyes should be irrigated with water for a minimum of 15 minutes. If hazardous liquids come into contact with an open wound or abrasion, the affected area shall be cleaned with soap and water at least three times. Workers should contact their supervisor immediately. This should be followed up by an examination by the worker’s personal physician.

D. Liquid spills should be cleaned up using rags and/or other absorbent materials. The residual material should be removed using a petroleum solvent. The solvent should be used sparingly on a cloth. Caution shall be exercised when using the solvents, as prolonged breathing of the vapors or contact with the skin should be avoided. Solvent resistant gloves and proper respiratory protection shall be provided to the worker by the Contractor pursuant to the MSDS for the solvent.

E. Most solvents are highly flammable and shall be kept away from heat and sparks. Solvent containers shall be kept tightly sealed when not in use. Workers shall wear safety glasses and protective gloves when using solvents. The rags, gloves, and absorbent material, when contaminated with solvent, shall be discarded in an impermeable container, i.e., double strength plastic bags.

3.4 PACKAGING AND LABELING

A. All fluorescent lamps shall be packaged, unbroken, in boxes clearly labeled with the name and address of the generator and a description of the material.

B. Broken lighting tubes/lamps, if present, shall be cleaned up in accordance with OSHA applicable regulations, placed in double plastic bags sealed with tape, and disposed as hazardous waste as required by the EPA and Commonwealth of Virginia.

C. All ballasts shall be segregated and packaged separately in a 55-gallon, open head, steel drum that meets Federal DOT criteria.

D. The packaging of all ballasts and PCB contaminated components shall be performed in a way that will prevent potential leakage during shipment to the recycler.

E. If the ballasts are leaking, 6 to 12 inches of absorbent material shall be added to the bottom of the drums before filling with ballasts. Additional absorbent material shall be placed in the interstitial areas between ballasts. Absorbent shall not be used in packaging of non-leaking ballasts.
F. The drums shall be packed full to prevent materials from shifting during shipment. However, drums shall not be "overpacked." No more than 200 ballasts shall be placed into a single drum and the weight shall not exceed 1,000 pounds.

G. Place all used disposable protective clothing, plastic, and contaminated rags in the drum.

H. All drums shall be properly sealed to prevent any leakage.

I. Each drum holding ballasts and/or PCB contaminated lighting fixture components shall be labeled as follows:

1. On two parallel sides of the container:

   "POLYCHLORINATED BIPHENYLS (PCB’S) ORM-E UN2315, BALLASTS."

2. On two opposite sides, use a “THIS END UP” label, with arrows pointing to the top of the drum.

3. If the above labels are not commercially available, the proper marking can be hand or mechanically ink printed. They must, however, be in a sharply contrasting color from the drum, and not be obscured by other labels or attachments.

4. The name and address of the generator and the date the ballasts were removed shall be placed on each drum.

3.5 DETERMINATION OF HAZARDOUS WASTE MATERIALS

A. All material outlined in the scope of work section as unidentified shall be characterized prior to disposal/recycling. The requirements of RCRA shall be utilized in determining whether a material is hazardous or non-hazardous.

B. Testing of waste shall be performed by an accredited laboratory retained by the Contractor. Include the cost of testing in the contract sum and supply all test results to the Owner.

3.6 PACKAGING OF WASTE


B. The Contractor shall ensure that each segregated Hazardous Waste is packaged for transport in appropriate containers and labeled in accordance with DOT regulations (49 CFR 100-180) and EPA’s RCRA regulations (40 CFR 261).
C. IMPORTANT: Do Not Mix Waste Streams - each Waste Type shall be placed in drums/containers containing only an identical type of waste. The Contractor shall take all appropriate care to ensure that incompatible wastes are not mixed.

D. The Contractor shall ensure that any Hazardous Wastes/Material generated during the course of this work are packaged into containers appropriate to the type of waste, and adequately sealed to prevent leakage or release.

E. The Contractor shall anticipate the types and quantities of wastes to be generated to avoid time delays.

F. Sealed and labeled containers shall remain sealed. Do not open previously sealed containers. Do not place additional waste into previously sealed containers.

G. Strict Prohibition: No liquid hazardous waste shall be dispensed into Roll-Off Containers.

H. The Contractor shall ensure that all containers of hazardous materials are labeled with appropriate signs, shipping placards, pictograms, etc. in accordance with DOT and OSHA GHS regulations. Adjacent to each label, the Contractor shall enter the date indicating when waste was first placed in each drum (Accumulation Start Date).

3.7 TEMPORARY STORAGE

A. Partially filled containers of hazardous waste may be stored at the work site for intermittent packaging provided:

1. Each container is properly labeled when it is first placed in service;

2. Each container remains closed at all times except when compatible waste types are added (do not mix waste streams);

3. A designated secure accumulation area is established, and

4. The storage container is secured from public access.

3.8 SHIPPING

A. A manifest must be prepared when fluorescent lamps, PCB waste, and other materials outlined in the scope of work are offered for transport for off-site treatment, storage, and recycling. The waste manifest fulfills requirements for a material’s Bill of Lading. Waste Manifests shall be properly completed by the Contractor for each waste shipment and shall list each transportation container including any non-hazardous waste or hazardous materials shipped. The manifest shall contain all information required by applicable Federal, State, and local hazardous waste or materials regulations. The Contractor shall provide all data required for waste transportation, treatment, and recycling, and for completion of hazardous waste or material generator report as required by the regulatory agency of jurisdiction.
B. To complete the waste document, the information provided shall include, but is not limited to Proper Shipping Name (i.e., ORM-D. UN2315); Total Shipment in Pounds, and the Quantity of Material being shipped.

C. A shipping label containing the appropriate address information shall be prepared and placed on top of the shipping drum/box and covered with transparent adhesive tape.

D. Recycling of all specified materials shall be in accordance with all State and Federal regulations.

E. All fluorescent lamps shall be transported to an approved recycling facility. The Contractor may have the drum(s) and other PCB materials transported to an approved ballast recycling facility which dismantles the ballast, segregates, and packages the PCB components of a ballast for incineration and then reclams non-contaminated metals. All PCB-contaminated materials remaining after recycling are to be destroyed by incineration.

F. The Contractor and the Transporter must comply with the DOT Emergency Response Communication Standards applicable to the shipment of hazardous materials.

G. All recycling sites shall be in compliance with all Federal, State, and local regulations.

3.9 RECYCLING OF NON-HAZARDOUS AND HAZARDOUS MATERIALS

A. All materials regardless of hazard classification shall be manifested for recycling and shall be recycled in accordance with all applicable Federal, State and local regulations.

1. Contact EPA, State and local authorities to determine specific material recycling requirements.

2. The recycler will be required to properly store and secure waste at all times. No debris shall be left in the yard or in uncovered or unlocked trucks or dumpsters. Incineration of debris is unacceptable.

B. Recycling of Hazardous Liquid or Solid Wastes:

1. Comply with RCRA, State and local regulations.

2. Retain all project documents provided by the recycling site.

3. At completion of hauling and recycling of each load submit copy of Uniform Hazardous Waste Manifest to the Owner.

END OF SECTION 13 28 00
SECTION 13 28 01
REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING BUILDING MATERIALS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

The Bidding Requirements, Contracting Requirements and Conditions of the Contract, and applicable parts of Division 1 – General Requirements shall be included in and made a part of this Section. ECS Hazardous Materials Report Dated April 20, 2016.

1.2 WORK INCLUDED

A. It is the responsibility of the Contractor to verify any and all existing conditions and quantities of materials to be removed prior to submittal of Bid. The Contractor shall, at a minimum, submit a Bid based on information and methodologies set forth in this Specification.

B. The scope of work included in these documents requires the Contractor to provide all labor, equipment, materials, and transportation necessary to complete the environmental abatement, remediation, and testing as specified herein.

C. The materials identified in the following table contain asbestos, therefore by regulation, and this Specification, require special handling and care. The purpose of this Section and Section 3 is to outline the procedures to be followed during the removal of these materials.

D. The Contractor shall remove and properly dispose the following estimated quantities of asbestos containing materials in accordance with this Specification. The quantities listed represents estimates only and are not guaranteed. The Contractor shall not use quantities listed herein as a sole basis for preparing bids. It is the responsibility of the bidder to review and confirm all quantities and field conditions, including: locations, surface area, thickness, cross-sectional area, component layers, and substrate conditions. Neither the Owner, nor the Owner's representative, the Owner's Agent, or the Asbestos Project Monitor, will be responsible for errors or omissions and/or changes for extra work arising from any bidders’ failure to become familiar with the existing site conditions, requirements of the work, and the results to be produced. By submitting a bid, the bidder further agrees that the description contained herein (i.e., quantities, descriptions, locations, areas, thickness, etc.) are adequate and that the bidder will produce the required results.

E. Asbestos Containing Building Materials

The Contractor shall remove and properly dispose of all of the following asbestos-containing building materials under the bid. Unless otherwise specified, the Contractor shall assume that all asbestos removal will occur within a negative pressure containment (minimum negative pressure 0.02" w.g.):
## Asbestos-Containing Building Materials (ACBMs)

<table>
<thead>
<tr>
<th>Material</th>
<th>General Location</th>
<th>Friability</th>
<th>Estimated Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9&quot; x 9&quot; Green, Red, Brown Floor Tiles, 12&quot; x 12&quot; Tan, Dark Brown and Gray Floor Tiles, Gray, Beige, Light Brown, and Brown Floor Tiles (unknown size) and associated Yellow, Green, Brown, and Black Mastics, and Gray Leveling Compound</td>
<td>Auditorium Stage Closet, Classrooms and Associated Closets, Hallways, Storage Rooms, Offices, Lobby and associated Foyer, Art and Music Rooms and associated Closets, Cafeteria and Kitchen and associated Closets</td>
<td>Category I</td>
<td>68,000 SF, varies from 2-3 layers</td>
</tr>
<tr>
<td>4&quot; Brown Cove Base and associated Brown Mastic</td>
<td>Auditorium Stage Closet</td>
<td>Category II</td>
<td>26 LF</td>
</tr>
<tr>
<td>Interior Beige Glass Block Window Glaze</td>
<td>Classrooms and Hallways in Each Wing, Art and Music Rooms and associated Hallways, (above suspended ceiling tiles)</td>
<td>Category II</td>
<td>5,200 LF</td>
</tr>
<tr>
<td>White Mudded Texture Pipe Fitting Insulation</td>
<td>Art Room Closet (likely throughout)</td>
<td>Friable</td>
<td>unknown</td>
</tr>
<tr>
<td>Interior Gray Soffit Cement Boards</td>
<td>Recreation Center Game and Craft Rooms and associated Hallway, (above suspended 2’ x 4’ ceiling tiles)</td>
<td>Category I</td>
<td>750 SF</td>
</tr>
<tr>
<td>White Interior Door Caulk</td>
<td>Recreation Center Doors</td>
<td>Category II</td>
<td>96 LF</td>
</tr>
<tr>
<td>White Acoustical Plaster Ceiling</td>
<td>Hallways, offices, restrooms (above suspended ceiling tiles and 1’ x 1’ ceiling tiles)</td>
<td>Friable</td>
<td>24,000 SF</td>
</tr>
<tr>
<td>Joint Compound associated with Drywall</td>
<td>Auditorium Stage Closet</td>
<td>Category II</td>
<td>160 SF</td>
</tr>
<tr>
<td>Exterior Residual White and Black Window Caulks</td>
<td>Exterior Windows (presumed all)</td>
<td>Category II</td>
<td>4,400 LF</td>
</tr>
<tr>
<td>Exterior Tan Door Caulk</td>
<td>Exterior Doors</td>
<td>Category II</td>
<td>280 LF</td>
</tr>
<tr>
<td>Exterior Gray Sealant on Brick Wall</td>
<td>Exterior Brick Wall near Exit 28</td>
<td>Category II</td>
<td>200 LF</td>
</tr>
<tr>
<td>Exterior White Electrical Patch Caulk</td>
<td>Center South Low-Level Roof</td>
<td>Category II</td>
<td>16 SF</td>
</tr>
<tr>
<td>Exterior Residual Black Tar on Metal Vent</td>
<td>Northwest Low-level Slant Roof</td>
<td>Category II</td>
<td>30 LF</td>
</tr>
<tr>
<td>Exterior Multi-Layered Black Flashing Caulk</td>
<td>Low Recreation Center Roof</td>
<td>Category II</td>
<td>300 LF</td>
</tr>
<tr>
<td>Exterior Gray Soffit Cement Board</td>
<td>Exterior Recreation Center Wall</td>
<td>Category II</td>
<td>240 SF</td>
</tr>
</tbody>
</table>

** SF = Square Foot, LF = Linear Foot, EA = Each
Drawings were developed by ECS with approximate ACM locations. However, Contractor is responsible for verifying all quantities. Any exception taken should be noted with bid submission. Contractor is responsible for the removal of the ACMs identified entirely. Quantities provided are estimates only. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL QUANTITIES.

Additional Abatement Notes:
The Contractor shall provide units costs for the removal of the following materials:

1. Thermal System Insulation (TSI) on pipes within chases behind all walls and above all ceilings (per linear foot);
2. Pipe Flange Gaskets in heating and plumbing systems of the building (per linear foot);
3. Concrete Masonry Unit (Block/Walls) with Vermiculite Filler (per square foot);
4. Boiler Components in boilers (gasket, fire brick, etc.);
5. Air Handler Components (interior components);
6. Fire Door Insulation in rated fire door and door casings;
7. Electrical Panels: Asbestos Cement Components in electrical systems;
8. Waterproofing Membrane/Mastics behind exterior walls, exterior veneer and/or subgrade walls (per square foot);
9. Mastic/Floor Felt associated with ceramic floor and/or wall tiles, wood flooring, wall paneling, and mirrors;
10. Radiator Components (interior components);
11. Water Fountain Components (interior components);
12. Light Fixture Insulation in incandescent light shields (per square foot);
13. Vibration Dampener Cloth on the HVAC units and ductwork.

Note 1: For unit cost pricing, the Contractor shall assume that all mobilization, insurance, notification, profit etc. are to be included in the unit cost estimate. The Contractor shall assume that the work will be performed during the scope of the contracted asbestos abatement work.

Note 2: The quantities indicated are for informational purposes only. The Contractor is responsible for verifying all quantities to be removed to complete the scope of work. The Owner’s representative will be present during abatement activities to verify quantities removed.

Note 3: During the performance of the project, the Contractor will be subject to inspection by the Owner’s representative. If the Contractor is found not in compliance with this Specification, the Contractor will stop all work immediately to resolve the violation. Standby time shall be at the contractor’s expense.

Note 4: Floor Tile and Mastic Removal; The Contractor shall remove this material within negative pressure enclosure (minimum neg. pressure 0.02” w.g.). The Contractor shall also be responsible for removal of multiple layers of flooring and mastic, if present. Where tile/mastic is present under carpet, furniture and/or partition walls, the Contractor shall be responsible for removal of carpet, furniture and wall framing also as asbestos waste unless it can be shown to the Owner’s on-site Representative that mastic is not adhered to the carpet, furniture, or framing. The Contractor shall also be responsible for
removal of flooring and mastic under all partition walls, carpet, fixtures, cabinets, furniture, etc. deemed accessible by the Owner and/or Owner’s Representative. The Contractor shall coordinate demolition to access these materials (if required) with the Owner and the general contractors on-site.

Note 5: The Abatement Contractor shall coordinate with the Mechanical, Electrical, Plumbing, and General Contractors to ensure that all appropriate systems that will be impacted by demolition have been properly decommissioned prior to the start of any work.

Note 6: The Abatement Contractor shall coordinate with the General Contractor selected for this project to verify that the structure will support the planned activities and comply with local building codes and OSHA requirements.

Note 7: During renovation, no visible emissions of dust are allowed. The Contractor must use dust control measures (i.e., water) during renovation.

Note 8: The white acoustical plaster ceiling is located above 1’ x 1’ ceiling tiles. The Contractor shall be responsible for removal of 1’ x 1’ ceiling tiles also as asbestos waste unless it can be shown to the Owner’s on-site Representative that the 1’ x 1’ ceiling tiles are not adhered to the white acoustical plaster and the ceiling tiles can be removed without disturbing the plaster ceiling.

Note 9: The asbestos-containing joint compound cannot be separated from the drywall wallboard and therefore; the drywall wallboard should be also considered asbestos waste.

F. Asbestos-Containing Building Materials contained herein have been previously determined to contain the following asbestos concentrations:

<table>
<thead>
<tr>
<th>Material</th>
<th>Asbestos Amount and Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>9” x 9” Green, Red, Brown Floor Tiles, 12” x 12” Tan, Dark Brown and Gray Floor Tiles, Gray, Beige, Light Brown, and Brown Floor Tiles (unknown size) and associated Yellow, Green, Brown, and Black Mastics, and Gray Leveling Compound</td>
<td>2 – 10% Chrysotile</td>
</tr>
<tr>
<td>4” Brown Cove Base and associated Brown Mastic</td>
<td>3 – 5% Chrysotile</td>
</tr>
<tr>
<td>Interior Beige Glass Block Window Glaze</td>
<td>5% Chrysotile</td>
</tr>
<tr>
<td>White Mudded Texture Pipe Fitting Insulation</td>
<td>25% Chrysotile</td>
</tr>
<tr>
<td>Interior Gray Soffit Cement Boards</td>
<td>18% Chrysotile</td>
</tr>
<tr>
<td>White Interior Door Caulk</td>
<td>2% Chrysotile</td>
</tr>
<tr>
<td>White Acoustical Plaster Ceiling</td>
<td>3% Chrysotile</td>
</tr>
<tr>
<td>Joint Compound associated with Drywall</td>
<td>3% Chrysotile</td>
</tr>
<tr>
<td>Exterior Residual White and Black Window Caulks</td>
<td>3% Chrysotile</td>
</tr>
<tr>
<td>Exterior Tan Door Caulk</td>
<td>3% Chrysotile</td>
</tr>
<tr>
<td>Exterior Gray Sealant on Brick Wall</td>
<td>4% Chrysotile</td>
</tr>
<tr>
<td>Material</td>
<td>Asbestos Amount and Type</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Exterior White Electrical Patch Caulk</td>
<td>2% Chrysotile</td>
</tr>
<tr>
<td>Exterior Residual Black Tar on Metal Vent</td>
<td>15% Chrysotile</td>
</tr>
<tr>
<td>Exterior Multi-Layered Black Flashing Caulk</td>
<td>15% Chrysotile</td>
</tr>
<tr>
<td>Exterior Gray Soffit Cement Board</td>
<td>30% Chrysotile</td>
</tr>
</tbody>
</table>

It is the Contractor’s responsibility to be aware of all materials which contain asbestos in the building.

1.3 PRE-EXISTING CONTAMINATION

The Contractor will be responsible for cleaning pre-existing contamination associated with the identified asbestos-containing building materials.

1.4 CODES AND REGULATIONS

A. General Applicability of Codes, Regulations and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes and regulations 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. Contractor Responsibility: The 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 Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Designer harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of the contractor, the contractor’s employees, or subcontractors.

C. Federal Requirements: Abide by all Federal requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials including, but not limited to, the following:

1. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration including but not limited to:

   29 CFR 1926.1101 - Asbestos in Construction
   29 CFR 1910.134 - Respiratory Protection;
   29 CFR 1926.103 - Respiratory Protection;
   29 CFR 1910.146 - Permit Required Confined Space;
   29 CFR 1926.20 - General Safety and Health Provisions;
   29 CFR 1926.21 - Safety Training and Education;
   29 CFR 1926.23 - First Aid;
   29 CFR 1926.24 - Fire Protection;
29 CFR 1926.25 - Housekeeping;
29 CFR 1926.28 - Personal Protective Equipment;
29 CFR 1926.51 - Sanitation;
29 CFR 1926.55 - Gases, Vapors, Fumes, Dusts, and Mists;
29 CFR 1926.56 - Illumination;
29 CFR 1926.57 - Ventilation;
29 CFR 1926.59 - Hazard Communication;
29 CFR 1926.200 - Accident Prevention Signs and Tags;
29 CFR 1926.300, 301, 302 - Hand and Power Tools;
29 CFR 1926.451 - Scaffolding;
29 CFR 1926.500, 502, 503 - Fall Protection;
29 CFR Subpart E - Personal Protective and Life Saving Equipment

2. DOT: U. S. Department of Transportation, including but not limited to:

49 CFR 171 and 172 - Hazardous Substances;
49 CFR 171-180 - General Awareness and Training Requirements for Handlers, Loaders and Drivers;
49 CFR 171-180 - Editorial and Technical Revisions

3. EPA: U. S. Environmental Protection Agency including but not limited to:

40 CFR 61-SUBPART M - National Emission Standard for Asbestos
40 CFR 61-Appendix A to SUBPART M Operations - Interpretive Rule Governing Roof Removal
40 CFR 763 - Asbestos Containing Material in Schools

D. Local Requirements: Abide by all local requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials.

E. Building Codes: Comply with applicable provision of state and/or local building codes that govern any part of the work, including but not limited to the following:

1. BOCA Chapter 33 Site Work, Demolition, and Construction with special attention to:
   a. BOCA 3304 Protection of the Public
   b. BOCA 3307 Health Hazards

1.5 REFERENCE STANDARDS

A. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in the Contract Documents, are defined to mean the associated names. Names and addresses
are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

**ACGIH**  
American Conference of Governmental Industrial Hygienists  
1330 Kemper Meadow Dr.  
Cincinnati, OH 45240 (513) 742-2020

**AIA**  
The American Institute of Architects  
1735 New York Ave., NW  
Washington, DC 20006 (202) 626-7300

**AIHA**  
American Industrial Hygiene Assoc.  
2700 Prosperity Ave., Suite 250  
Fairfax, VA 22031 (703) 849-8888

**ANSI**  
American National Standards Institute  
11 West 42nd St., 13th Floor  
New York, NY 10036 (212) 642-4900

**ASHRAE**  
American Society of Heating, Refrigerating and Air-Conditioning Engineers  
1791 Tullie Circle, NE  
Atlanta, GA 30329 (404) 636-8400

**ASTM**  
American Society for Testing and Materials  
100 Barr Harbor Drive  
West Conshohocken, PA 19428-2959 (610) 832-9585

**NFPA**  
National Fire Protection Assoc.  
One Batterymarch Park  
P.O. Box 9101  
Quincy, MA 02269-9101 (617) 770-3000 (800) 344-3555

**UL**  
Underwriters Laboratories  
333 Pfingsten Rd.  
Northbrook, IL 60062 (708) 272-8800

**B. Federal Government Agencies:** Names and titles of federal government standard- or specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard- or specification-producing agencies of the federal government. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

**CFR**  
Code of Federal Regulations  
(Available from the Government Printing Office)  
N. Capitol St. between G and H St., NW  
Washington, DC 20402 (202) 783-3238
1.6 DEFINITIONS

A. **Accreditation**: A formal recognition that an organization (e.g. laboratory) is competent to carry out specific tasks or type of tests.

B. **Accredited Laboratory**: A laboratory that has been evaluated and given approval to perform a specified measurement or task (such as the National Voluntary Laboratory Accreditation Program), usually for a specific property or analyze for a specified period of time.

C. **Accredited Training Provider**: A training provider that meets the standards established by EPA to train supervisors and workers.

D. **Adequately Wet**: To sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from the asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wetted.

E. **Air Sampling**: Sampling of asbestos concentrations within the asbestos control area and inside the physical boundaries which is representative of the airborne asbestos concentrations which may reach the breathing zone of personnel potentially exposed to asbestos. The PM shall be responsible for all area monitoring.

F. **Amended Water**: Water containing a wetting agent or surfactant with a maximum surface tension of 2.9 Pa (29 dynes per square centimeter) when tested in accordance with ASTM D 1331.
G. **Area Monitoring:** Sampling of asbestos concentrations within the asbestos control area and inside the physical boundaries which is representative of the airborne asbestos concentrations which may reach the breathing zone of personnel potentially exposed to asbestos. The PM shall be responsible for all area monitoring.

H. **Asbestos:** The term asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

I. **Asbestos Control Area:** That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

J. **Asbestos-Containing Material (ACM):** Any material containing more than 1% asbestos as determined using the methods specified in appendix A, subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy.

K. **Asbestos-Containing Waste Material:** Any waste that contains asbestos. This term includes filters or other materials contaminated with asbestos. This term also includes regulated asbestos-containing material waste and materials contaminated with asbestos including disposable equipment and clothing.

L. **Asbestos Debris:** Pieces of ACM that can be identified by color, texture, or composition, or dust, if the dust is determined by an accredited inspector to be ACM.

M. **Asbestos Fibers:** Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

N. **Background:** The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

O. **Blank:** A non-exposed sample of the medium used for testing, such as a wipe or filter, which is analyzed like other samples to determine whether (1) samples are contaminated with asbestos before samples are collected (e.g., at the factory, or at the testing site), (2) the samples are contaminated after sample collection (e.g., during transportation to the laboratory or in the laboratory).

P. **Breathing Zone:** A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches around the nose and mouth of the face.

Q. **Ceiling Concentration:** The concentration of an airborne substance that shall not be exceeded.
R. **CFR - The Code of Federal Regulations:** The basic component of the Federal Register publication system. The CFR is a codification of the regulations of the various Federal Agencies.

S. **Change Rooms and Shower Facilities:** Rooms equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination with a shower facility in between.

T. **Competent Person:** An individual who meets the requirements of OSHA as a "competent person" for the specific activity involved in the work. The "competent person" must meet the requirements of 29 CFR 1926.32(f), and 29 CFR 1926.1101.

U. **Containment:** A process to protect workers and the environment by controlling exposures to asbestos dust and debris created during abatement.

V. **Decontamination Room:** Room for removal of contaminated personal protective equipment (PPE).

W. **Detection Limit:** The minimum of a component that a method can reliably measure.

X. **Eight Hour Time Weighted Average (TWA):** Airborne concentration of asbestos to which an employee is exposed, averaged over an 8-hour time work day.

Y. **Encapsulants:** Specific materials in various forms used to chemically or physically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.
   1. Removal Encapsulant (can be used as a wetting agent).
   2. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material).
   3. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage).
   4. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

Z. **Engineering Controls:** Measures other than respiratory protection or administrative control that are implemented at the work site to contain, control, and/or otherwise reduce exposure to asbestos-contaminated dust and debris. The measures include process and product substitution, isolation, and ventilation.
AA.  **Exposure Monitoring**: The personal air monitoring of an employee’s breathing zone to determine the amount of contaminant (e.g. asbestos) to which he/she is exposed.

BB.  **Federal Register**: A document published daily by the Federal government that contains either proposed or final regulations.

CC.  **Friable Asbestos Material**: One percent asbestos containing material that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

DD.  **Glovebag Technique**: Those asbestos removal and control techniques put forth in 29 CFR 1926.1101 Appendix G.

EE.  **HEPA Filter Equipment**: High efficiency particulate air (HEPA) filtered vacuum and/or exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

FF.  **Intact**: ACM that has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

GG.  **Leak-tight**: That solids or liquids cannot escape or spill out. It also means dust-tight.

HH.  **Negative Pressure Enclosure (NPE)**: A pressure differential and ventilation system where the work area is maintained at a negative pressure relative to air pressure outside the work area.

II.  **Non-friable Asbestos Material**: Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

JJ.  **Permissible Exposure Limit (PEL)** (for asbestos fibers): 0.1 fibers per cubic centimeter of air as an 8 hour time weighted averaged as determined by 29 CFR 1926.1101.

KK.  **Personal Monitoring**: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.

LL.  **Personal Samples (for sampling asbestos fibers)**: Air samples collected from within the breathing zone of a worker, but outside the respirator. The samples are collected with a personal sampling pump, pulling 1 to 2.5 liters/minute of air.

MM.  **Protection Factor**: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the
breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

NN. **Respirator**: A device designed to protect the wearer from the inhalation of harmful atmospheres.

OO. **Surfacing Material**: Material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).

PP. **Thermal System Insulation (TSI)**: Insulation applied to pipes, fittings, boilers, breaching, tanks, ducts or other components to prevent heat loss or gain.

QQ. **Visible Emissions**: Any emissions containing particulate material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

RR. **Wetting Agent**: A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 2.9 Pa (29 dynes per square centimeter) when tested in accordance with ASTM D 1331.

SS. **Work Area**: The area where asbestos abatement or related work is performed which is defined and/or isolated to prevent the spread of asbestos fibers, or debris, and entry by unauthorized personnel.

TT. **Work Practice**: A procedure followed by workers that is intended to minimize exposure to the worker and the environment.

1.7 **SUB-CONTRACTING REQUIREMENTS**

A. In the event that the Contractor subcontracts a portion of the Work, the sub-contractor to the Contractor must meet all requirements of the Contractor specified herein and within related contract documents. All sub-contractors must be approved, in writing, by the Owner and Owner's Representative prior to the Contractor and sub-contractor entering into an agreement to perform work on-site.

1.8 **NOTIFICATION TO CONTRACTOR**

A. **Asbestos-Containing Building Materials**

1. The Work included within this Specification involves the disturbance of asbestos-containing building materials (ACBMs). All ACBMs known to be present at the worksite is presented in Section 1.02 of this Specification. The discovery of additional ACBMs by the Contractor shall require immediate notification to the Owner’s Representative, the employees of all other trades present on-site, and superintendent or foreman assigned to the project. All newly discovered ACBMs will
be bulk sampled by the Owner’s Representative. No newly discovered ACBMs are to be disturbed until instructed as such by the Owner.

2. Removing or otherwise disturbing ACBMs may release asbestos fibers into building’s atmosphere creating a health risk to all building occupants. The Contractor shall inform all laborers, supervisors, foreman, superintendents, and other employees of the location of ACBMs within the building and ensure care is taken while working around the ACBMs to ensure the materials are not disturbed and be certain all employees on-site are informed of proper work procedures following an unplanned disturbance.

3. The Contractor shall ensure that during his work any encounter or disturbance to ACBMs will be performed in accordance with all applicable regulations and requirements set forth herein.

1.9 COORDINATION

A. Coordinate the abatement of the materials listed within this Specification with other subcontractors on-site in order to maintain efficient and orderly completion of the Work.

1. Scheduling of operations shall be in a manner required to achieve the most satisfactory results where the completion of one aspect of the Work is essential to the commencement of work involving other components.

B. Notifications

1. It is the Work of the Contractor to inform all employees and contractors on-site the nature of the asbestos work, location of ACBMs, applicable regulations, and any relevant requirements listed in this Specification. Notification prior to the start of work must be made to:
   a. Employees performing environmental remediation/abatement,
   b. Employees who will be in the work area during the performance of environmental remediation/abatement, and;
   c. Employers of employees who work and/or will be working in areas adjacent to the environmental remediation/abatement while the work is in progress.

2. Contractor is responsible for submitting notification of emergency service agencies including fire, ambulance, police or other agency that may service the work site in case of an emergency. Methods of entering work area and emergency entry and exit locations must be made available to all emergency service agencies.

3. Notifications of Emergency: Any employee or visitor to the job site may notify emergency service agencies at any time without change to the Contract and/or Contract Sum.

4. Notify Federal and State Agencies: Prior to removal of Regulated Asbestos Containing Materials (RACMs), notification is required by either Virginia and/or the EPA. This notification must be filed by a Virginia certified asbestos abatement contractor 20 calendar days prior to commencement of work. When using mechanical methods for the removal of floor tile and floor mastics, these materials become Regulated Asbestos-Containing Materials (RACMs). The Contractor is responsible for all permits and fees associated with the project notification.
C. **Emergency Directory**

1. Develop a directory of all emergency contacts involved in the project. Include the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site. List business name, contact person, normal business and emergency telephone, mobile phone and fax numbers and addresses of:
   a. Owner, Owner's Representative, and Project Administrator.
   b. Contractor's General Superintendent, supervisory personnel and Contractor's home office.
   c. Environmental Remediation Sub-Contractor's Superintendent, supervisory personnel and Contractor's home office.
   d. Emergency services including but not limited to fire, ambulance, doctor, hospital, police, power and gas companies, telephone company.
   e. Local, state, and federal agencies with jurisdiction over the project.

2. Post copies of the Emergency Directory adjacent to the entrance to clean room of Decontamination Unit.

D. **Alternate Procedures:** Contractor shall comply with procedures specified in all applicable regulations and this Specification. Worker protective measures, engineering controls, and work practices all must be in compliance with this Specification and applicable regulations.

1. Variance: If procedures within this Specification cannot be implemented due to site-specific conditions or if the Contractor is aware of a more efficient approach, the Contractor may complete and submit a Request for Variance to the Project A/E, either prior to bidding or during the course of the project. The Request for Variance must include:
   a. Details of the problem(s) encountered – or potential time/cost savings – and recommended alternatives.
   b. The Project A/E will review such variance submittal(s) for compliance with Federal, State, and Local/Municipal regulations and submit recommendations for acceptance or rejection of the request for variance.
   c. Alternative methods described in all Request for Variance proposals must, at a minimum, comply with:
      i. Those recommended by manufacturer of approved materials.
      ii. Those required by pertinent regulations of authority-having-jurisdiction.

2. Methods described in the Contractor's Request for Variance may not be implemented without written approval by the Project A/E and/or the Owner's Representative.

1.10 **ENVIRONMENTAL ABATEMENT SUB-CONTRACTOR QUALIFICATIONS**

A. Environmental Abatement Sub-Contractor shall be licensed by the Commonwealth of Virginia for the removal of asbestos-containing building materials.

B. **Project Supervisor:** The Contractor shall employee a Project Supervisor who has experience in managing asbestos abatement projects and implementing engineering controls as well as being familiar with allowable work practices, personal and atmospheric protective measures, disposal of asbestos procedures, etc. The Contractor's Project Supervisor will serve as the Competent Person as required by federal and Commonwealth of Virginia regulations. The Project Supervisor will be responsible for performing the Work described herein in accordance with all applicable
federal and Commonwealth of Virginia regulations as well as this Specification. Additionally, the Project Supervisor shall meet the following minimum criteria:

1. **Training:** The Project Supervisor must have a valid, non-expired training certification from a Commonwealth of Virginia approved trainer for a course that meets the requirements of the EPA Model Accreditation Plan for asbestos abatement contractor/supervisor and licensed by the Commonwealth of Virginia as a Worker Supervisor.

2. **Experience:** The Supervisor must:
   a. Have a minimum of five (5) years experience in the on-site management of asbestos abatement projects, and
   b. Have served as Project Supervisor on a minimum of five (5) asbestos abatement projects of similar size and scope of work.

3. **Responsibilities**
   a. Inspect asbestos removal work for conformance with all applicable regulations and current industry standards.
   b. Perform or oversee OSHA monitoring and ensure proper personal protective equipment (PPE) is being utilized by all abatement personnel.
   c. Ensure work is performed as described within this Specification at all times.
   d. Continuously evaluate engineering controls established to prevent hazardous exposure to personnel and to the environment at all times.

4. The Supervisor must meet all the requirements as a Competent Person as required by OSHA 29 CFR 1926.

5. The Supervisor must be an employee of the Contractor.

C. **Foreman:** If the Contractor will staff more than 10 asbestos abatement workers, the Contractor shall provide a Foreman to directly supervise and manage no more than 10 environmental remediation workers at any time. Each Foreman will act as the Competent Person as required by OSHA 29 CFR 1926 for the workers the Foreman is responsible for. The Foreman shall be responsible for oversight of the workers and report directly to the Project Supervisor. If there are 10 or fewer workers on the environmental remediation project the Supervisor may fill the Foreman's position. The Foreman must meet all the requirements as a Competent Person as required by OSHA 29 CFR 1926. The Foreman must be an employee of the Contractor.

1.11 **RECORD KEEPING**

A. **Daily Log:** The Contractor shall maintain a Daily Log posted in an area accessible to the Owner, the Owner’s Representative, and the General Contractor (GC). The Daily Log must consist of the following items:

   1. **Meetings:** reason, attendants, summary of discussion;
   2. **Special or unusual events,** i.e. barrier breaching, equipment failures, loss of electrical power;
   3. **Accidents:** injured individual, nature of injury, treatment, etc.;
   4. **Documentation of Contractor's completion** of the following:
      a. Inspection of work area preparation prior to start of removal and daily thereafter;
b. Removal of any sheet plastic barriers;
c. Removal of waste materials from work area;
d. Decontamination of equipment (list items);
e. Final inspection/final air test analysis;
f. List of subcontractors at the site;
g. Count of personnel at the site;
h. High and low temperatures, general weather for outdoor work;
j. Stoppages, delays, shortages, losses;
k. Emergency procedures;
l. Orders and requests of governing authorities;

B. Entry/Exit Log: The Contractor shall maintain a daily log, placed adjacent to the entrance to each work area, documenting the dates and time of, but not limited to, the following items:

1. Visitors, permitted and unauthorized, with the following information:
   a. Name
   b. Organization
   c. Entry time
   d. Exit Time
   e. Respiratory protection

2. Personnel, by name, entering and leaving the work area with the following information:
   a. Printed Name
   b. Identification Number
   c. Entry Time
   d. Exit Time
   e. Respiratory Protection

C. The following information shall be posted on-site in a location accessible to workers, A/E, Owner’s Representative, and Project Administrator:

1. Air Monitoring Results: Finals to be transmitted via fax or email to the Owner/Owner’s Representative within 24 hours of sample analysis. Post the respiratory protection requirements for the work in progress.

2. Documentation of inspections by OSHA, EPA or local authority.

3. Respiratory Protection Program.

4. Telephone numbers and locations of emergency services including, but not limited to, fire, ambulance, doctor, hospital, police, power and gas companies, telephone company.

5. Other records:
   a. Waste Manifests and shipping records.
   b. Landfill receipts.
   c. Accident reports.

D. Special Reports:

1. General: All special reports are to be submitted directly to the Owner’s Representative unless otherwise instructed by the Owner. Special reports shall be submitted within 24 hours of events requiring a special report. The Owner and any
other parties involved or affected by the occurrence shall receive copies of each special report.

2. Reporting Unusual Events: If an unplanned event of significant nature occurs during the project (examples: failure of pressure differential system, rupture of temporary enclosures, injury to personnel, etc), prepare and submit report. List chain of events, persons participating, response by Contractor’s personnel, evaluation of results or effects, and similar pertinent information.

1.12 WORKER PROTECTION

A. Worker Training

1. AHERA Accreditation: All workers/supervisors are to be accredited as Asbestos Workers/Supervisors as required by the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

2. OSHA Training: All workers/supervisors performing asbestos work shall be trained in accordance with 29 CFR 1926.1101 for Class I work. Provide training for all workers/supervisors who will perform any asbestos related activity (including non-friable asbestos activities). Training method and length shall be in accordance with the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

B. Medical Surveillance

1. Before exposure to airborne asbestos fibers or use of negative pressure respirators, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 and 29 CFR 1910.134.

2. Medical examination shall be performed initially and annually thereafter.

C. Medical Records: Maintain complete and accurate records of employees’ medical examinations, medical records, and exposure data for a period of 30 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee’s physician upon the request of the employee or former employee.

D. Environment, Safety and Health Compliance: In addition to detailed requirements of this Specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.1101, 40 CFR 61-SUBPART A and 40 CFR 61-SUBPART M. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the Work. Where the requirements of this Specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement shall apply.
E. Respiratory Protection Program

1. Instruct and train each worker in proper respirator use and require that each worker always wear a respirator, properly fitted on the face, in the Work Area.

2. Furnish each employee required to wear a negative pressure or powered air purifying respirator with a respirator fit test at the time of initial fitting and at least every six (6) months thereafter as required by 29 CFR 1926.1101.


4. The Contractor shall provide the appropriate type of respirators for each task as stipulated by 29 CFR 1926.1101, 29 CFR 1926.103, and 29 CFR 1910.134 or provide and initial exposure assessment as outlined below.

5. Initial Exposure Assessment: Submit level of respiratory protection intended for each operation required by the project. Base this selection on an "Initial Exposure Assessment" as required by OSHA 29 CFR 1926.1101. Submit information to support this "Initial Exposure Assessment."

a. Submit data from exposure monitoring for the PEL and EL from prior asbestos jobs within 12 months;

b. Submit monitoring and analysis that were performed in compliance with the OSHA asbestos standard in effect;

c. Submit data that was obtained under workplace conditions "closely resembling" those that will exist during the work;

d. Submit data from past asbestos jobs where the type of asbestos abatement and other work, material, control methods, work practices, and environmental conditions closely resemble those that will exist during the work;

e. Submit exposure data from prior asbestos jobs where the work that was conducted by employees whose training and experience are no more extensive than that of employees performing the current job;

f. Based on the exposure data from the previous asbestos jobs, select respiratory protection for the Work that will, to a high degree of certainty, prevent worker exposures (inside the respirator) that exceed the Permissible Exposure Limits (PEL) set forth in this Section of the Specifications.

6. Require that respiratory protection be used at all times that there is any possibility of disturbance of ACM whether intentional or accidental.

7. Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re-occupancy.

8. Regardless of Airborne Fiber Levels: Require that the minimum level of respiratory protection used be Powered air-purifying respirators with high efficiency filters.
9. Do not allow the use of single-use, disposable, quarter-face or half-face respirators for any purpose.

F. Hazardous Communication Program: Establish and implement a Hazardous Communication Program as required by 29 CFR 1926.59.

1.13 PROJECT MONITOR

A. The Owner shall contract an Industrial Hygiene Consultant (IHC) to provide on-site project monitoring and over-sight of the Contractor. The IHC shall not have any direct or indirect association with the GC or the Contractor. The IHC shall employ and provide the services of an on-site Project Monitor (PM).

B. Project Monitor Qualifications

1. The PM shall hold a current Commonwealth of Virginia license as Asbestos Project Monitor and be trained through the National Institute of Occupational Safety and Health (NIOSH) 582 (or equivalency) course.

2. The IHC shall maintain a laboratory deemed proficient through the NIOSH Proficiency Testing Program (PAT) for Phase Contrast Microscopy (PCM) for analysis of asbestos air samples.

C. Project Monitor Responsibilities

1. The PM shall be responsible for daily air monitoring, to ensure the building’s atmosphere outside the work area remains uncontaminated with airborne particulates.

2. The PM shall be responsible for overseeing the Contractor’s work practices while ensuring compliance with this Specification and all applicable federal and State of Virginia regulations.

3. The PM shall perform visual inspections of the work area(s) throughout each shift, including prior to the start of work, to ensure all containment barriers are sealed, negative pressure is adequate, and proper engineering controls are in place.

4. It is the work of the PM to perform final clearance visual inspections to ascertain that all visible asbestos has been removed and that no visible dust and/or debris remain in the work areas.

1.14 SAMPLING

A. Baselines

1. Air Samples: Prior to the initiation of asbestos abatement work, the PM shall collect Transmission Electron Microscopy (TEM) and Phase Contrast Microscopy (PCM) air samples throughout the building to establish baseline levels of fiber concentrations comparable with the analytical results of the final clearance air samples.
B. **Sampling During Work**

1. Air Sampling Outside Work Area: The PM shall collect Phase Contrast Microscopy (PCM) air samples from outside the work area during each shift. A minimum of two (2) air samples from outside the work area shall be collected during each shift.

   a. Asbestos: Maintain fiber concentrations at lowest possible levels, not to exceed 0.010 fibers/cubic centimeter (f/cc). If concentrations rise above or equal to 0.010 f/cc, stop abatement work and re-evaluate engineering controls. The PM shall determine source of the high reading and suggest appropriate measures to reduce airborne fiber concentrations.

2. Air Sampling Inside Work Area: The PM shall monitor airborne fiber concentrations within the work area. The purpose of this sampling is to continuously evaluate engineering controls established within the work area. A minimum of one (1) Phase Contrast Microscopy (PCM) air sample inside work area must be collected every four (4) hours of each shift while the removal of asbestos is in progress.

   a. Asbestos: Maintain fiber concentrations at lowest possible levels, not to exceed 0.100 f/cc. If concentrations rise above this figure revise work procedures to lower fiber levels.

C. **Final Clearance**

1. It is the work of the PM to collect final clearance air samples following the successful completion of a final visual inspection which verifies all specified ACMs have been removed from each work area and no dust or debris remain.

2. Aggressive Air Sampling: Upon completion of abatement work and successful final clearance visual inspection, the PM shall perform final clearance aggressive air sampling for asbestos in accordance with Virginia regulations.

   a. PCM Analysis: If the total quantity of ACMs to be removed within the Work Area is less than 260 linear feet, 160 square feet and/or 35 cubic feet, PCM aggressive air samples will be collected from within each work area. Each of the samples collected from within the work area shall not exceed 0.010 f/cc as required by the Commonwealth of Virginia. Air samples shall have a minimum volume of 1,200 liters per sample.

   b. TEM Analysis: If the total quantity of ACMs to be removed within the Work Area is greater than 260 linear feet, 160 square feet and/or 35 cubic feet, TEM air samples will be collected from within each work area. The average of the fiber concentrations in the samples collected from within the work area shall not exceed 70 structure per square millimeter (70 s/mm²) as required by the Commonwealth of Virginia. Air samples shall have a minimum volume of 1,200 liters per sample.

3. The Contractor shall be responsible for any additional cost due to the Owner for the re-collection of final clearance air samples due to unacceptable initial results including sample analysis and sample collection fees.
D. **OSHA Monitoring:** OSHA Monitoring is work of the Contractor and is not covered in this section. However, it must be conducted daily as required and in accordance with 29 CFR 1926.1101.

E. **Stop Work:** The PM may issue a stop work order only when the integrity of the enclosure is breached, results of sampling performed outside of the work area exceed baseline levels (or >0.010 f/cc), or results of inside work area sampling reveals inadequate engineering controls. The Contractor shall correct the fault in work area enclosure and/or work procedures at no cost to the Owner.

### 1.15 SUBMITTALS

Five (5) days prior to the start of work, **submit 2 copies** of the following to the Owner’s Representative for review. Do not start work until these submittals are approved by the Owner’s Representative indicating that the submittal is returned for unrestricted use.

**A. Environmental Abatement Contractor - General**

1. Commonwealth of Virginia Asbestos Abatement Contractor license;

2. Contingency Plans;

3. Emergency Directory;

4. Notifications: Copy of notification sent to the Commonwealth of Virginia (if apply);

5. Resumes for Supervisor and Foremen;

6. Accreditation: Submit evidence in the form of training course certificate and Commonwealth of Virginia Worker or Worker Supervisor license for the Supervisor, Foreman and workers as being trained in asbestos health and safety in accordance with the Commonwealth of Virginia regulations and EPA AHERA protocols;

7. Medical surveillance for Supervisor, Foreman, and workers;

8. Respirator Fit Test Records for each abatement worker;

9. Testing Laboratory information for laboratory performing OSHA monitoring and/or sample analysis;

10. Hazard Communication Program as required by 29 CFR 1910.1200 (e);

11. Chemical Information List:
   a. Submit written chemical information list for hazardous materials that are intended to be used at the Site;
   b. Prepare chemical information list using an inventory of hazardous materials and their respective safety data sheets. Arrange list in alphabetical order according to common name. Include chemical name, and identify locations where the hazardous materials are intended to be used;
   c. Submit complete chemical information list of hazardous materials and associated safety data sheets at least two weeks prior to commencement of Project (not just before a specific activity using hazardous materials commences). This information is required in advance for adequate planning purposes.
12. Safety Data Sheets:
   a. Submit Safety Data Sheets (SDS) for all products that contain hazardous constituents and are intended to be used in the Work or stored on site.
      i. The Contractor must comply with manufacturer’s recommendations for handling, storage, use, and disposal of all materials including hazardous constituents.
   b. Submit safety data sheets five (5) days prior to the Pre-Construction meeting as specified above. No product shall be used for which a SDS has not been previously submitted.
   c. If a change in material(s) used is required during the Work, submit appropriate SDS for the new materials and amend all applicable documentation (hazard communication program, respiratory protection program, etc) as required. Submission of SDS and amended documents must be completed ten (10) days prior to the delivery of the new material(s) to the site.

B. Environmental Abatement Contractor - Licenses and Qualifications: The Owner shall make the final determination regarding the approval of the Contractor’s qualifications in reference to this Work. The Owner shall require at a minimum the following qualifications to be met in order to remove ACBMs from the facility:

1. Contractor shall submit all training accreditations and Commonwealth of Virginia licenses for employees who will be used to perform the specified work.

2. Contractor shall submit a statement, notarized and signed (by an Owner, Partner, Officer, or Principle of the company), which verifies the accuracy of the following information which shall be submitted to the Owner:
   a. Documentation of successful completion of at least three (3) abatement projects of similar size, scope, and dollar value.
      i. Reference names, telephone numbers, and addresses of Owner representatives for the above referenced three (3) abatement projects.
      ii. Include air monitoring data from an independent monitoring firm demonstrating compliance with OSHA airborne hazardous particulate concentrations during the work
   b. Names of Contractor representatives who shall have complete authority to speak for and make commitments for the Contractor (including size and dollar value) of individual projects previously supervised.

3. OSHA Compliance: Submit evidence of full compliance with medical surveillance and respiratory protection provisions of existing regulations. Include at a minimum:
   a. Written respiratory protection,
   b. Medical surveillance programs, and
   c. Proof of respirator fit testing.

4. Disclosure Statement: Contractor shall submit the following statement notarized and signed (by a principle of the company) verifying accuracy and truth of the following information:
   a. Description of any asbestos abatement or other environmental remediation projects which have been prematurely terminated, including the circumstances surrounding such termination.
   b. List of any contractual penalties which the Contractor has incurred for breach or non-compliance with Contract Specifications on previous projects, such as overruns of completion time leading to liquidated damages.
   c. List of any citations levied against the Contractor by any governmental entity for violations related to asbestos abatement, or other environmental remediation
work including the name and location of the project, date(s) of violation(s), and allegation resolution.

d. Description of all legal proceeding, lawsuits or claims which have been filed or levied against the Contractor or any of his past or present employees for asbestos abatement, or other environmental remediation related activities.

e. Acknowledgement of any of the above circumstances will not necessarily result in automatic disqualification.

i. Failure to disclose any of this information shall be cause for automatic disqualification.

ii. The Owner shall be the sole determinant of the Contractor’s ability to remove hazardous materials competently and correctly.

f. Affirmation that no principle(s) has/have been suspended, debarred or otherwise restricted by any Department or Agency of the Federal Government or of a State Government from doing business with such Department or Agency.

PART 2 PRODUCTS

2.1 HAZARDOUS MATERIALS

The Contractor is required to have onsite, at all times, SDS on products being utilized during the execution of the Work. The Owner may, at his discretion, refuse to allow any products which he feels may for any reason jeopardize the safety of building occupants and/or workers within the building. In this event, the Contractor must submit a substitute product that is less hazardous. If an appropriate substitute product is not available, the Contractor may submit an alternative plan for protecting the building occupants/workers from exposure to the hazardous material. The Owner has the final authorization for all products being used by the Contractor.

2.2 MATERIALS AND EQUIPMENT

The Contractor’s use of equipment, protective clothing, special facilities and/or devices shall be in accordance with applicable regulations and manufacturer’s instructions.

2.3 RESPIRATORS

A. Respirator Bodies: Provide full face powered air purifying respirators (PAPR’s). Equip full face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit (0 degrees Celsius).

B. Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with 42 CFR Part 84 and ANSI Z228.2. Also, additional cartridge sections may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH Certification.

C. Non-permitted Respirators: Do not use single use, disposable, quarter face or half face respirators.
D. **Supplied Air Respirator Systems:** If deemed to be necessary through compliance with 29 CFR 1926.103 and/or 29 CFR 1910.146, Supplied Air Respirator Systems shall comply with the following:

1. Provide air used for breathing in supplied air respiratory systems that meets or exceeds standards set for C.G.A. type 1 (Gaseous Air) Grade D.

2. Facepiece and Hose: Provide full facepiece and hose by same manufacturer that has been certified by NIOSH/MSHA as an approved Type "C" respirator assembly operating in pressure demand mode with a positive pressure facepiece.

3. Auxiliary backup system: In atmospheres which contain sufficient oxygen (greater than or equal to 19.5 percent oxygen) provide a pressure-demand full facepiece supplied air respirator equipped with an emergency back up HEPA filter.

4. Escape air supply: In atmospheres which are oxygen deficient (less than 19.5 percent oxygen) provide a pressure-demand full facepiece supplied air respirator incorporating an auxiliary self-contained breathing apparatus (SCBA) which automatically maintains an uninterrupted air supply in pressure demand mode with a positive pressure face piece.

5. Backup air supply: Provide a reservoir of compressed air located outside the Work Area which will automatically maintain a continuous uninterruptible source of air automatically available to each connected facepiece and hose assembly in the event of compressor shut-down, contamination of air delivered by compressor, power loss or other failure. Provide sufficient capacity in the back-up air supply to allow a minimum escape time of one-half hour times the number of connections available to the Work Area. Air requirement at each connection is the air requirement of the respirators in use plus the air requirement of an average-sized adult male engaged in moderately strenuous activity.

6. Warning device: Provide a warning device that will operate independently of the building's power supply. Locate so that alarm is clearly audible above the noise level produced by equipment and work procedures in use, in all parts of the Work Area and at the compressor. Connect alarm to warn of:
   a. Compressor shut down or other fault requiring use of backup air supply
   b. Carbon Monoxide (CO) levels in excess of 5 PPM/V

7. Compressor Motor: Provide a compressor driven by an electric motor. Do not use a gas or diesel engine to drive compressor. Insure that electrical supply available at the work site is adequate to energize motor.

8. Air Intake: Locate air intake remotely from any source of automobile exhaust or any exhaust from engines, motors, auxiliary generator or buildings.
2.4 PROTECTIVE CLOTHING

A. **Coveralls**: Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.

B. **Boots**: Provide work boots with non-skid soles, and where required by OSHA, foot protectives, for all workers. Provide boots at no cost to workers. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with ACM. Dispose of boots as asbestos-contaminated waste at the end of the work.

C. **Hard Hats**: Provide head protectives (hard hats) as required by OSHA for all workers, and provide 4 spares for use by Designer, Project Administrator, and Owner. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of type with plastic strap type suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.

D. **Goggles**: Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.

E. **Gloves**: Provide work gloves to all workers and require that they be worn at all times in the Work Area. Do not remove gloves from Work Area and dispose of as asbestos-contaminated waste at the end of the work.

2.5 SHOWER FACILITIES

A. When using mechanical removal methods, provide pre-fabricated or site-built shower facilities. Supply hot and cold water to shower head which can be controlled from inside shower.

B. **Filters**: Provide cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the Work Area. Provide units with disposable filter elements as indicated below. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter.

1. **Primary Filter** - Passes particles 20 microns and smaller.

2. **Secondary Filter** - Passes particles 5 microns and smaller.

C. Supply a sufficient quantity of soap and towels for the workers and authorized visitors.

2.6 EQUIPMENT FOR VISITORS

Disposable coveralls, head covers, and footwear covers shall be provided by the Contractor for the PM, Owner’s Representative, Owner, or other authorized visitors for
entry into and inspection of the asbestos work area. If a Supplied Air Respiratory System is in use, the Contractor shall provide authorized visitors with facepiece, hose, and hook-up to the Supplied Air Unit. The Contractor will not be responsible for providing other types of respiratory protection (i.e., negative pressure or powered air purifying respirators).

2.7 ELECTRICAL SERVICE

A. **General:** Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service.

B. **Ground Fault Protection:** Equip all circuits for any purpose entering the Work Area with ground fault circuit interrupters (GFCI). Locate GFCI's exterior to Work Area so that circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters equipped with test button and reset switch for circuits to be used for any purpose in work area, decontamination units, exterior, or as otherwise required by national electrical code, OSHA or other authority. Locate in panel exterior to Work Area.

C. **Electrical Power Cords:** Provide grounded extension cords. Use “hard-service” cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

D. **Lamps and Light Fixtures:** Provide general service incandescent lamps, sealed quartz halogen construction lights, or fluorescent lamps of wattage required for adequate illumination as required by the work. Protect lamps with guard cages or tempered glass enclosures, where fixtures are exposed to breakage by construction operations. Provide vapor tight fixtures in work area and decontamination units. Provide exterior fixtures where fixtures are exposed to the weather or moisture. Provide lighting with a secure base to insure that they will not be knocked over. Keep lights away from combustible materials.

2.8 SCAFFOLDING

A. Provide scaffolding, ladders and/or staging, etc. as necessary to accomplish the work of this Specification. At this time, scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of scaffolding shall comply with applicable OSHA provisions.

B. Equip rungs of metal ladders, etc. with an abrasive non-slip surface.

C. Provide a nonskid surface on scaffold surfaces subject to foot traffic.

2.9 FIRST AID

A. Comply with governing regulations and recognized recommendations within the construction industry.
B. At a minimum, the onsite first aid kits will be sufficient for the numbers of workers onsite and shall include the following:

1. Various sizes and types of bandages
2. Sterile sponges
3. Constricting bandage
4. Eye patches
5. Antiseptic wipes
6. First aid cream
7. Triangular bandage
8. Disposable gloves
9. Eye irrigating solution
10. Aspirin or non-aspirin pain reliever
11. Scissors
12. Tweezers
13. Rescue blanket
14. First aid guide
15. First aid tape
16. Non-stick pads
17. Cold/hot packs
18. Splints
19. Stretch gauze

2.10 FIRE EXTINGUISHERS

Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

2.11 HEPA FILTERED FAN UNITS

A. General: Supply the required number of HEPA filtered fan units to the site in accordance with this Specification. Use units that meet the following requirements.

B. Cabinet: Constructed of durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches [0.76 meters] to fit through standard-size doorways. Provide units whose cabinets are:

1. Factory-sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance;
2. Arranged to provide access to and replacement of all air filters from intake end;
3. Mounted on casters or wheels.
C. **Fans**: Rate capacity of fan according to usable air-moving capacity under actual operating conditions.

D. **HEPA Filters**: Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame.

   1. Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
   
   2. Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent.
   
   3. Provide filters that bear a UL586 label to indicate ability to perform under specified conditions.
   
   4. Provide filters that are marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.

E. Pre-filters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. Provide units with the following pre-filters:

   1. First-stage pre-filter: low-efficiency type (e.g., for particles 100 µm and larger).
   
   2. Second-stage (or intermediate) filter: medium efficiency (e.g., effective for particles down to 5 µm).

F. Provide units with pre-filters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.

G. **Instrumentation**: Provide units equipped with:

   1. Manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed;
   
   2. A table indicating the usable air-handling capacity for various static pressure readings on the Magnehelic gauge affixed near the gauge for reference, or the Magnehelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) (Liters / Second (LPS)) air delivery at that point;
   
   3. Elapsed time meter to show the total accumulated hours of operation.

H. **Safety and Warning Devices**: Provide units with the following safety and warning devices:

   1. Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter;
   
   2. Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge;
3. Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading) (yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge) (red);

4. Audible alarm if unit shuts down due to operation of safety systems.

I. Electrical Components: Provide units with electrical components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit is to be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet are to be grounded.

2.12 CLEANING AND DECONTAMINATION

A. Plastic Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 6 mil (0.15 mm) thick, clear, frosted, or black as indicated.

B. Disposal Bags: Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled with three labels with text as follows:

1. First Label: Provide in accordance with 29 CFR 1910.1200(f) of OSHA's Hazard Communication standard:

   DANGER
   CONTAINS ASBESTOS FIBERS
   AVOID CREATING DUST
   CANCER AND LUNG DISEASE HAZARD
   BREATHING AIRBORNE FIBERS IS
   HAZARDOUS TO YOUR HEALTH

2. Second Label: Provide in accordance with U. S. Department of Transportation regulation on hazardous waste marking. 49 CFR parts 171 and 172. Hazardous Substances

   RQ-ASBESTOS WASTE
   CLASS 9
   NA2212-PG III

3. Third Label: Provide the name of the waste generator (Owner's name), the location from which the waste was generated and the names and addresses of the contractor and transporter. This label must be durable, able to repel dirt and moisture (e.g., permanent marker). Label must be placed directly on disposal bag(s) in a legible format.

2.13 WETTING MATERIALS

A. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the ACM and retardation of fiber release
during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons (19 liters) of water.

B. **Removal Encapsulant:** Provide a penetrating type encapsulant designed specifically for removal of ACM. Use a material which results in wetting of the ACM and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of one ounce of a mixture of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether in five gallons (19 liters) of water.

2.14 **GLOVEBAGS**

A. Glovebag abatement is not anticipated on this project.

B. If the Contractor requests permission to conduct removal of materials using glovebags, the glovebag abatement will be allowed only if performed in a critical barrier containment and with the written permission of the Owner’s Representative, in accordance with regulations of Commonwealth of Virginia and OSHA Regulation 29 CFR 1926.1101.

2.15 **ENCAPSULANTS**

All encapsulants shall conform to current USEPA requirements and shall contain no toxic or hazardous substances as defined in 29 CFR 1926.59.

**PART 3 EXECUTION**

3.1 **VENTILATION**

A. Provide adequate ventilation of the Work as required to ensure that Owner, workers and visitors are not potentially exposed to asbestos containing materials.

B. Provide and maintain ventilation in functional, efficient working order for the duration of the Project.

C. Prevent fumes, vapors, and dust related to the Work from infiltrating other parts of the building or adjacent buildings which may be occupied.

D. Upon completion of work, with wet pollutant emitters (e.g., paints, mastic, glues, and/or mastic/glue removers) purge all work areas of airborne contaminants by supplying adequate outside air and exhausting contaminants to the building exterior.

3.2 **PROTECTION**

A. **Permits and Notifications:** Obtain necessary permits in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities prior to the start of work. Prior to removal of Regulated Asbestos Containing Materials (RACMs), notification is required
by either Virginia and/or the EPA. This notification must be filed by a Virginia certified asbestos abatement contractor 20 calendar days prior to commencement of work. When using mechanical methods for the removal of floor tile and floor mastics, these materials become Regulated Asbestos-Containing Materials (RACMs). The Contractor is responsible for all permits and fees associated with the project notification.

B. Equipment

1. Respirators: At a minimum all Class I work will be performed utilizing PAPR's. Provide personnel engaged in pre-cleaning, cleanup, handling, encapsulation and removal of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103.

2. Protective Clothing: Provide personnel exposed to asbestos with disposable "non-breathable," whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable gloves to protect hands. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.

3. Eye Protection: Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

C. Storage: Waste generated during abatement shall be stored in a construction trailer or hauling container that shall comply with 40 CFR 61-SUBPART M, State, regional, and local standards. Temporary on-site storage shall be provided by the Contractor.

D. Electrical Service:

1. General: If necessary, provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work.

2. Lockout: Lockout all existing power to or through the work area. Unless specifically noted otherwise existing power and lighting circuits to the work area are not to be used. All power and lighting to the Work Area is to be provided from outside of the work area.

E. Heating, Ventilating and Air Conditioning (HVAC) Systems: Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the asbestos work areas. Seal intake and exhaust vents in the asbestos work area with 6 mil (0.15 mm) thick plastic sheet and tape. Seal seams in HVAC components that pass through the asbestos work area.

F. Securing Work Area: Secure work area from access by public, occupants, staff or users of the building. Accomplish this where possible, by locking doors, windows, or other means of access to the area. This is a requirement of the Contractor at all times including times when Contractor is not on-site during the performance of the work including times when Contractor personnel temporarily leave the work area.
1. If for any reason the work area(s) can not be adequately secured, the Contractor shall contact Campus Police before leaving the work area.

2. The Asbestos Project Monitor shall maintain a log of PCM air sample results from air samples collected outside of the work area, specifically occupied areas adjacent to the work area, for reference by Owner as needed. At the completion of the project, results of all PCM air samples collected from outside of the work area shall be turned over to Owner for recordkeeping purposes.

3. Asbestos Project Monitor shall notify Owner immediately if Contractor’s work results in outside work area PCM samples exhibiting a total fiber concentration in excess of 0.01 f/cc or if visible emissions are observed emanating form the work area containment.

G. Access: Limit access to regulated areas to authorized persons as defined by OSHA, and to the Owner, Designer, Project Administrator or a representative authorized by one of these entities.

H. Demarcation of Work Area: Provide bilingual warning signs printed in English and Spanish at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 (minimum 20” by 14”) displaying the following:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN
THIS AREA

I. Warning Labels: Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
BREATHING ASBESTOS DUST MAY
CAUSE SERIOUS BODILY HARM
3.3 WORK AREA ENCLOSURE

A. Pre-cleaning: Prior to establishment of the enclosure, wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos. Clean movable objects and remove them from the work area. Mobile objects will be assumed to be asbestos contaminated and are to be either cleaned with amended water and a HEPA vacuum and then removed from the area or wrapped and then disposed of as asbestos-contaminated waste.

B. Completely isolate the Work Area from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area. Should the area beyond the Work Area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, clean those areas in accordance with the procedures indicated in this Section. Perform all such required cleaning or decontamination at no additional cost to Owner.

C. Each enclosure consists of a work area and a decontamination area. The Work Area where the asbestos removal operations occur is to be separated from the decontamination area by physical curtains, doors, and/or airflow patterns that force any airborne contamination back into the Work Area.

D. Critical Barriers

1. Completely separate the Work Area(s) from other portions of the building, and the outside by closing all openings with sheet polyethylene barriers at least 6 mil (0.15 mm) in thickness, or by sealing cracks leading out of Work Area(s) with duct tape.

2. Individually seal all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, and other openings into the Work Area(s) with duct tape alone or with polyethylene sheeting at least 6 mil (0.15 mm) in thickness, taped securely in place with duct tape. Maintain seal until all work including decontamination is completed. Take care in sealing of lighting fixtures to avoid melting or burning of sheeting.

3. Provide sheet polyethylene barriers at least 6 mil (0.15 mm) in thickness as required to seal openings completely from each Work Area into adjacent areas. Seal the perimeter of all sheet polyethylene barriers with duct tape or spray cement.

4. Cleaning and Sealing Surfaces: After cleaning with water and a HEPA vacuum, surfaces of stationary objects should be covered with two layers of polyethylene sheeting. The sheeting should be secured with duct tape or an equivalent method to provide a tight seal around the object.

F. Primary Barrier

1. Protect building and other surfaces in the Work Area(s) from damage from water and high humidity or from contamination from asbestos-containing debris, slurry or high airborne fiber levels by covering with a primary barrier as described below.
2. Sheet Plastic/Polyethylene: Protect surfaces in the Work Area(s) with at least two (2) layers of polyethylene sheeting on walls, from floor to ceiling.

3. Repair of Damaged Polyethylene Sheeting: Remove and replace polyethylene sheeting which has been damaged by removal operations or where seal has failed allowing water to seep between layers. Remove affected sheeting and wipe down entire area. Install new sheet polyethylene only when area is completely dry.

G. Stop Work: If the Critical or Primary barrier falls or is breached in any manner stop asbestos removal work immediately. Does not start work until authorized by the Project Manager.

H. Extension of Work Area: If the Critical Barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add affected area to the Work Area, enclose it as required by this Section and decontaminate.

I. Secondary Barrier: Place a secondary layer of polyethylene sheeting as a drop cloth to protect the primary layer from debris generated by the asbestos abatement work is specified in the appropriate work sections.

J. Negative Pressure Enclosure

1. Isolate the Work Area(s) from all adjacent areas or systems of the building with a Pressure Differential that will cause a movement of air from outside to inside at any breach in the physical isolation of the Work Area(s).

2. HEPA Ventilation: Provide a local exhaust system in accordance with ANSI Z9.2 and 29 CFR 1926.1101 that will provide a negative pressure within the Work Area. Local exhaust equipment shall be operated 24 hours per day and shall be leak proof to the filter and equipped with HEPA filters. In no instance shall the building ventilation system be used as the local exhaust system for the Work Area(s).

3. The local exhaust system shall terminate out of doors and remote from any public access or ventilation system intakes unless authorized in writing by the Owner’s Representative.

4. Arrange the Work Area(s) and Decontamination Units so that the majority of make up air comes through the Decontamination Units. Use only the Personnel or Equipment Decontamination Unit at any time and seal the other so that make up air passes through unit in use. Arrange air circulation through the Personnel Decontamination Unit so that it produces a movement of air from the Clean Room through the Shower Room into the Equipment Room. At each opening, the air flow velocity must be sufficient to provide visible indications of air movement into the work area.

5. Relative Pressure in Work Area: Continuously maintain the Work Area(s) at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure
differential when measured across any physical or critical barrier must equal or exceed a static pressure of 0.02 inches of water.

6. Use a differential pressure meter or manometer to demonstrate the required pressure differential at every barrier separating each Work Area from the balance of the building, equipment, ductwork or outside.

7. **Air Flow Tests**: Air flow patterns will be checked before removal operations begin, at least once per operating shift and any time there is a question regarding the integrity of the enclosure. The primary test for air flow is to trace air currents with smoke tubes or other visual methods. Flow checks are made at each opening and at each doorway to demonstrate that air is being drawn into the enclosure and at each worker’s position to show that air is being drawn away from the workers location and toward the HEPA filtration unit.

8. Isolation of return air intakes: Erect seals with an air space at the return air intakes within each Work Area. Pressurize this space with clean or outside air or air that has been HEPA-filtered air so that it is at a pressure greater than either the Work Area or intake.

K. **Personal Decontamination Unit**

1. Provide Decontamination Units with a shower that comply with 29 CFR 1926.51(f)(4)(ii) through (v) for each Work Area. Decontamination Units shall be physically attached to each Work Area. Note: Shower facility is required when using mechanical removal methods.

2. Build a Personnel Decontamination Unit and Equipment Decontamination Unit onto and integral with each Work Area.

3. Each individual shall perform the following decontamination procedures upon exiting work area:
   a. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators in the equipment room and seal in two impermeable bags for disposal. Label the outer bag as asbestos contaminated waste.
   b. Proceed to shower, when required, located between the equipment and clean rooms. Note: When using mechanical removal methods, it is required that all employees shower before changing into street clothes.
   c. Wash and remove respirator.
   d. Proceed to clean room.

4. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system.

5. Dispose of asbestos contaminated work clothing as asbestos contaminated waste.
3.4 SCAFFOLDING

A. During the erection and/or moving of scaffolding, care must be exercised so that the polyethylene floor covering is not damaged.

B. Clean, as necessary, debris from non-slip surfaces.

C. At the completion of abatement work clean construction aids within the Work Area, wrap in one layer of polyethylene sheeting at least 6 mil (0.15 mm) in thickness and seal before removal from the Work Area.

3.5 WORK PROCEDURE

A. All Class I work, which includes the removal of friable asbestos-containing materials and associated asbestos-contaminated debris, is to be performed in a full containment:

1. Cover all windows, doors, ventilation units, ceiling, floor and wall surfaces with plastic sheeting sealed with tape and glue securely, as required. Use a minimum of two (2) layers of polyethylene sheeting at least 6 mil (0.15 mm) in thickness on floors that are not identified as ACM.

2. As specified, a pressure differential across any physical or critical barrier within containment must be equal or exceed a static pressure of 0.02 inches of water (0.02” w.g.).

3. Attach a three (3)-station Personnel Decontamination Unit for worker decontamination to the Work Area.

B. When removing non-friable asbestos-containing material (Class II Work), a full containment is not required; however, it requires a minimum of two (2) workers to remove asbestos containing materials in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. One individual shall remove the materials, while the second worker applies the wetting agent and HEPA vacuums or bags up any debris generated.

1. All Class II work is to be performed in a critical barrier containment with polyethylene sheeting at least 6 mil (0.15 mm) in thickness demarcated to restrict public access.

2. As specified, a pressure differential across any physical or critical barrier within containment must be equal or exceed a static pressure of 0.02 inches of water (0.02” w.g.).

3. When removing floor tile and/or mastic using mechanical methods, a three (3)-station Personnel Decontamination Unit for worker decontamination, with operating shower, shall be attached to the Work Area.

4. Cleaning of mobile objects/items contaminated with asbestos-containing materials shall consider a Class II work.

C. Do not allow eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics in the Work Area.
D. Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein.

E. Personnel of other trades not engaged in the removal of asbestos containing material and demolition of asbestos contaminated materials shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this Specification are complied with by the trade personnel.

F. Pre-clean all Work Areas of pre-existing contamination/debris to include asbestos containing material fragments that have been dislodged. Pre-abatement visual cleanliness will be determined by the PM.

G. Wet Removal techniques shall be used. Dry removal will not be permitted.

H. Coordinate abatement in a manner to minimize the number of work areas that will require final clearance air sampling.

I. High pressure washers are not permitted for the removal of ACM.

J. Wet asbestos-containing material (ACM) with a fine spray of amended water prior to and during removal, cutting, or other handling so as to reduce the emission of airborne fibers.

K. For areas not requiring full containment: With a minimum of two (2) workers, remove asbestos containing material (ACM) in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. One individual shall remove the material while the second worker applies the wetting agent and HEPA vacuums or bags up any debris generated.

L. Remove material and immediately place in 6 mil (0.15 mm) in thickness polyethylene disposal bags.

M. Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing. Twist neck of bags, bend over, and seal with minimum three wraps of duct tape. Clean outside and move to Wash Down Station adjacent to Equipment Decontamination Unit.

N. Any asbestos waste material which will not fit inside pre-structured polyethylene bags shall be sealed in three (3) layers of polyethylene sheeting at least 6 mil (0.15 mm) in thickness, labeled, and inspected by the PM prior to removal from the Equipment Decontamination Unit.

O. Housekeeping: Maintain surfaces of the Work Area(s) free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT USE COMPRESSED AIR.
P. **Stop Work:** If an asbestos fiber release or spill occurs outside of the Work Area(s), stop work immediately, correct the condition to the satisfaction of the PM and Owner’s Representative, including clearance sampling, prior to resumption of work. In addition, the PM has Stop Work authority.

3.6 **CONTAMINATION OF BUILDING MATERIALS DUE TO CONTAINMENT BREACH**

C. If during the performance of the Work it is determined by the PM through air sampling and/or observations of dust and debris, that an Work Area breech or by other means the Contractor has caused areas of the building to be contaminated with asbestos, the Contractor shall stop work immediately. The Contractor shall clean all affected areas of the building determined to be contaminated by the PM, Owner or Owner’s Representative at no additional cost to the Owner.

D. All decontamination and cleaning work will be performed by the Contractor until such cleaning has achieved a level of cleanliness deemed satisfactory by the PM via PCM air sample results which demonstrate the airborne fiber concentration in the affected area is less than 0.01 f/cc in addition to a visual inspection for the presence of dust, debris, and/or bulk asbestos material.

E. The Contractor shall credit or reimburse the Owner for all costs associated with additional air sampling and consulting performed by the PM related to the contamination caused by the Contractor.

F. Contractor accepts all liability for damages caused by Contractor’s negligence and shall accept all responsibility and liability for damages claimed by any lawsuit or other legal action brought against the Owner, its employees, the Owner’s Representatives and the PM as a result of asbestos contamination caused by Contractor.

3.7 **ALTERNATIVE REMOVAL METHODS**

A. All alternate methods shall be pre-approved by the Owner and the PM prior to execution. This includes alternate Work Area/Enclosure and Decontamination Units. The Owner and/or Owner’s Representative will authorize in writing any acceptance of alternate removal methods.

B. **Mini-Enclosures**

1. A mini enclosure is a small walk-in enclosure which accommodates no more than two persons. Provide a fabricated or job-made enclosure constructed of polyethylene sheeting at least 6 mil (0.15 mm) in thickness. Place the enclosure under negative pressure by means of a HEPA filtered vacuum or similar HEPA filtered ventilation unit.

2. Provide a remote Personnel Decontamination Unit for worker decontamination:

a. **Work Room:** Construct Work Room in the same manner as a Primary Barrier fabricated from polyethylene sheeting at least 6 mil (0.15 mm) in thickness.
Arrange so that Primary Barrier provides both a Critical and Primary Barrier. Line walls and floor of Work Room with a continuous Secondary Barrier.

b. **Change Room**: Provide a Change Room attached to each Work Room. Fabricate Change Room from polyethylene sheeting at least 6 mil (0.15 mm) in thickness in the same manner as a Primary Barrier. Locate so that access to Work Area is though Change Room.

c. **Step Off Area**: Cover floor in front of entry to Change Room with one layer of polyethylene sheeting at least 6 mil (0.15 mm) in thickness. Securely anchor sheet plastic to prevent slipping.

d. **Flapped Door Construction**: Provide flapped door as entry to Change Room and entry from Change Room to Work Room. Fabricate each flapped door from overlapping contacting layers of polyethylene sheeting. Fasten each layer on the top and one side. Each flap is to be three (3) inches longer than door opening. Reinforce free side and bottom of each sheet with duct tape. Alternate sides that are fastened on each layer. Form arrows pointing to entry side using duct tape on inside and outside of door.

e. **Signage**: At entry to Change Room post caution sign as required by 29 CFR 1926.

3. **Testing**: The mini-enclosure shall be inspected for leaks and smoke tested to detect breaches, and breaches sealed.

3.8 **CLEAN-UP**

A. Wet wipe, using a water and surfactant solution, all surfaces within each Work Area including polyethylene barriers with paper towels or disposable rags. The surfactant shall be of a type that penetrates friable asbestos materials so that the material is thoroughly wetted.

B. When the surfaces have dried, HEPA vacuum all surfaces within each Work Area starting at the ceiling, then top of wall and working downward to the floor.

C. HEPA vacuum the floor using a floor attachment with rubber floor seals and adjustable floor to attachment height. Vacuum the floor in parallel passes with each pass overlapping the previous by one half the width of the floor attachment. At the completion of one cleaning, vacuum the floor a second time at right angles to the first.

D. Repeat wet wiping and HEPA vacuuming until no visible residue remains.

E. Remove used HEPA unit pre-filters and replace with clean filters. Use filters are to be disposed of asbestos contaminated waste.

3.9 **FINAL CLEARANCE**

A. Prior to removal of polyethylene barriers and after pre-clearance cleanup of gross contamination, the PM shall conduct a visual inspection of all areas affected by the removal to ascertain that all specified ACM has been removed and no visible dust or debris remains within each Work Area.
B. If ACM, dust or debris is visibly identified by the PM, the Contractor shall re-clean the Work Area(s).

C. Upon obtaining a satisfactory final visual inspection from the PM, the Contractor shall apply a lock-down encapsulant. The encapsulant shall be spray applied to ceiling, walls, floors, and other areas exposed in the removal area. The exposed area shall include but not be limited to plastic barriers, furnishings, and articles to be discarded as well as dirty change room, air locks for bag removal and decontamination chambers/units.

D. When encapsulant is dry to the touch, the PM shall conduct final clearance sampling in accordance with Section 1.15C of this Specification.

3.10 TEAR-DOWN

A. After acceptable airborne concentration are attained but before the HEPA unit is turned off and the Work Area Enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials.

B. Reestablish HVAC mechanical and electrical systems in proper working order.

C. Polyethylene sheeting, duct tape, etc. utilized in the construction of each Work Area Enclosure shall be disposed of as asbestos-contaminated waste.

3.11 DISPOSAL OF ASBESTOS

A. Waste generated as a result of asbestos removal shall be disposed of at an Environmental Protection Agency (EPA) and State of Virginia-approved asbestos landfill.

B. Each asbestos disposal bag and wrapped material shall be affixed with a warning and Department of Transportation (DOT) label.

C. The name of the waste generator and the location at which the waste was generated shall be clearly indicated on the outside of each asbestos disposal bag and wrapped material.

D. Prevent contamination of the transport vehicle. These precautions include lining the vehicle cargo area with polyethylene sheeting (similar to the Work Area Enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete.

E. Procedure for hauling and disposal shall comply with 40 CFR 61-SUBPART M, State, regional, and local standards.

F. Workers unloading the asbestos disposal bags shall wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.
END OF SECTION 13 28 01
SECTION 13 28 02
LEAD CONTROL PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS and CONDITIONS OF THE CONTRACT, and applicable parts of DIVISION 1 – GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

1.2 WORK INCLUDED

A. As part of the base bid, the Contractor shall be required to remove and dispose of all lead containing and lead based materials as part of demolition activities. All work shall comply with 29 CFR 1926.62. The work outlined in this Specification involves demolition activities of these building materials and steps needed to limit occupational and environmental exposure to lead hazards.

The following lead based painted surfaces were identified during the representative XRF testing performed by ECS on March 21 and 22, and April 13, 2016.

<table>
<thead>
<tr>
<th>Reading</th>
<th>Location</th>
<th>Area/Room</th>
<th>Substrate</th>
<th>Color</th>
<th>Component</th>
<th>Pb (mg/cm²)</th>
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<td>Window Mullion</td>
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</tr>
</tbody>
</table>
Note: Pb – Lead in milligrams per square centimeter (mg/cm²)

### Notes

All similar materials located within the building should be assumed to be lead containing.

C. It is important to note that other surfaces are reported to contain lead in concentration less than 1.0 milligrams per square centimeter (< 1.0 mg/cm²). These surfaces may still contain concentration of lead in the paint, which when disturbed, may generate lead dust greater than the Permissible Exposure Limit (PEL) of 50 micrograms per cubic millimeter (µg/m³) as an 8-hour Time Weighted Average (TWA) established by U.S. Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1926.62 – Lead in Construction. Therefore, any disturbances to lead-based and lead-containing painted components shall be performed in accordance with OSHA regulation 29 CFR 1926.62 – Lead in Construction and this Specification.

### 1.3 RELATED WORK

- **A.** Section 13281 Hazardous and Universal Waste Management
- **B.** Section 13282 Removal and Disposal of Asbestos-Containing Building Materials

### 1.4 CODES AND REGULATIONS

- **A.** General Applicability of Codes and Regulations, Guidelines and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, guidelines 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. Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, protection of workers, visitors to the site, and persons occupying areas adjacent to the site and packaging, salvaging, and delivering lead-containing materials. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Designers harmless for failure to comply with any applicable work, packaging, salvaging, delivering, safety, health or other regulation on the part of himself, his employees, or his subcontractors.

C. Federal Requirements: which govern lead based paint work or packaging, salvaging, and delivering of hazardous waste materials include but are not limited to the following:

1. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:

   29 CFR 1910.134  - Respiratory Protection;
   29 CFR 1926.103  - Respiratory Protection;
   29 CFR 1926.20  - General safety and health provisions;
   29 CFR 1926.21  - Safety training and education;
   29 CFR 1926.23  - First Aid;
   29 CFR 1926.24  - Fire Protection;
   29 CFR 1926.25  - Housekeeping;
   29 CFR 1926.28  - Personal protective equipment;
   29 CFR 1926.51(f)  - Washing facilities;
   29 CFR 1926.55  - Gases, vapors, fumes, dusts, and mists;
   29 CFR 1926.56  - Illumination;
   29 CFR 1926.57  - Ventilation;
   29 CFR 1926.59  - Hazard Communication;
   29 CFR 1926.55  - Gases, Vapors, Fumes, Dusts, and Mists
   29 CFR 1926.62  - Lead Construction Standard;
   29 CFR 1926.200 - Accident Prevention Signs and Tags;
   29 CFR 1926.353  - Ventilation: Welding, cutting or heating of metals of toxic significance;
   29 CFR 1926.300, 301, 302  - Hand and power tools;
   29 CFR 1926.451  - Scaffolding;
   29 CFR 1926.500, 502, 503  - Fall Protection.
   29 CFR 1926 Subpart E - Personal Protective and Life Saving Equipment

2. DOT: U. S. Department of Transportation, including but not limited to:

   49 CFR 171 and 172  - Hazardous Substances
3. **EPA:** U. S. Environmental Protection Agency (EPA), including but not limited to:

   40 CFR 260, 261, - Resource Conservation and Recovery
   262, 263 and 264 Act (RCRA)
   RRP Rules - Lead Renovation, Repair and Painting (RRP) Program

D. **State Requirements:** Abide by all State requirements which govern packaging, salvaging, and disposal of hazardous waste materials.

E. **Local Requirements:** Abide by all local requirements which govern lead abatement work or packaging, salvaging, and disposal of hazardous waste materials.

F. **Building Codes:** Comply with applicable provision of state and/or local building codes that govern any part of the work.

1.5 **DEFINITIONS**

A. **Accreditation:** A formal recognition that an organization (e.g. laboratory) is competent to carry out specific tasks or type of tests.

B. **Accredited Laboratory:** A laboratory that has been evaluated and given approval to perform a specified measurement or task (such as the National Lead Laboratory Accreditation Program), usually for a specific property or analyze for a specified period of time.

C. **Accredited Training Provider:** A training provider that meets the standards established by EPA to train risk assessors, inspectors, supervisors, and workers.

D. **Action Level:** Employee exposure, without regard to use of respirators, to an airborne concentration of lead of thirty micrograms per cubic meter (30 µg/m³) of air averaged over an 8-hour period in an occupational/industrial environment. In a domicile or other environment where 24-hour exposure is possible, the action level is: exposure to an airborne time weighted average (24 hours) of concentration of lead of eight micrograms per cubic meter (8 µg/m³) of air.

E. **Area Monitoring:** Sampling for lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations that may reach the breathing zone of personnel potentially exposed to lead. The PM shall be responsible for all area monitoring.

F. **Blank:** A non-exposed sample of the medium used for testing, such as a wipe or filter, which is analyzed like other samples to determine whether (1) samples are contaminated with lead before samples are collected (e.g., at the factory, or at the testing site), (2) the samples are contaminated after sample collection (e.g., during transportation to the laboratory or in the laboratory).
G. **Breathing Zone:** A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches around the nose and mouth of the face.

H. **Building Component:** Any part of a building coated with paint.

I. **Ceiling Concentration:** The concentration of an airborne substance that shall not be exceeded.

J. **CFR - The Code of Federal Regulations:** The basic component of the Federal Register publication system. The CFR is a codification of the regulations of the various Federal Agencies.

K. **Detection Limit:** The minimum of a component that a method can reliably measure.

L. **Eight-Hour Time Weighted Average (TWA):** Airborne concentration of lead to which an employee is exposed, averaged over an 8-hour workday as indicated in 29 CFR 1926.62.

M. **Engineering Controls:** Measures other than respiratory protection or administrative control that are implemented at the work site to contain, control, and/or otherwise reduce exposure to lead-contaminated dust and debris. The measures include process and product substitution, isolation, and ventilation.

N. **Exposure Monitoring:** The personal air monitoring of an employee’s breathing zone to determine the amount of contaminant (e.g. lead) to which he/she is exposed.

O. **Federal Register:** A document published daily by the Federal government that contains either proposed or final regulations.

P. **Hazardous Waste:** As defined in RCRA the term "hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

1. Cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or

2. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

3. As defined in the regulations, a solid waste is hazardous if it meets one of four conditions:

   a. Exhibits a characteristic of a hazardous waste (40 CFR Sections 261.20 through 262.24).

   b. Has been listed as hazardous (40 CFR Section 261.31 through 261.33).
c. Is a mixture containing a listed hazardous waste and a non-hazardous solid waste (unless the mixture is specifically excluded or no longer exhibits any of the characteristics of hazardous waste).

d. Is not excluded from regulation as a hazardous waste.

Q. HEPA - High Efficiency Particulate Air: A filter capable of filtering out particles of 0.3 microns or greater from a body of air at 99.97% efficiency or greater.

R. Landfill: A disposal facility or part of a facility where hazardous waste is placed in or on land and which is not a land treatment facility, a surface impoundment, or an injection well.

S. Lead Based Paint (LBP): Protective or decorative coating which contains lead in quantities greater than EPA and State of Virginia allowable concentrations.

T. µg - Micrograms: The prefix "micro-" means "1/1,000,000 of" (one millionth of). A microgram is 1/1,000,000 of a gram and 1/1,000 of a milligram. A microgram is equal to about 35/1,000,000,000 (thirty-five billionths) of an ounce. 28,400,000 µg is equal to 1 ounce.

U. Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter (50 µg/m³) of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than 8 hours in a work day, the PEL shall be determined by the following formula: PEL (micrograms/cubic meter of air) = 400/Number of hours worked per day.

V. Personal Monitoring: Sampling of the lead dust concentrations within the breathing zone of an employee.

W. Personal Samples (for sampling lead dust): Air samples collected from within the breathing zone of a worker, but outside the respirator. The samples are collected with a personal sampling pump, pulling 1 to 4 liters/minute of air.

X. Solid Waste: As defined in RCRA the term "solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under the Clean Water Act, or special nuclear or byproduct material as defined by the Atomic Energy Act of 1954.

Y. TCLP (Toxicity Characteristic Leaching Procedure): A test, called the extraction procedure that is designed to identify wastes likely to leach hazardous concentrations of particular toxic constituents into the ground water as a result of improper management. It is a characteristic of hazardous waste.
1.6 WORKER PROTECTION

All workers are to be notified of the presence of components painted and glazed with lead-based and lead-containing products. Workers shall comply with 29 CFR 1926.62 for all personal protective equipment (PPE) and awareness training for lead.

1.7 SUBMITTALS

A. Before the start of work, submit the following to the Owner's Representative for review. Do not begin work until these submittals are returned with the Owner's Representative's action stamp indicating that the submittals are returned for unrestricted use.

1. Testing Laboratory Qualifications:
   a. Submit the name, address, and telephone number of the testing laboratory selected to perform the Toxicity Characteristic Leaching Procedure (TCLP) testing and the analysis for lead content in the air to evaluate personal exposure. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/reeaccreditation.

2. Universal Waste Management:
   a. Submit a Universal Waste Management Plan within 14 days after award of contract to the Owner's Representative for approval. The Hazardous Waste Management plan shall comply with applicable requirements of Federal, State, and local hazardous waste regulations and address:

      i. Procedures to segregate wastes into separate waste streams to minimize the quantity of hazards waste generated.
      ii. Testing to identify hazardous wastes associated with the work.
      iii. Estimated quantities of wastes to be generated and disposed of.
      iv. Transporter / disposal facility documentation including, name, location, EPA identification number, hazardous waste permits and a 24 hour point of contact.
      v. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
      vi. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
      vii. Spill prevention, containment, and cleanup contingency measures to be implemented.
      viii. Procedures and schedule for waste containment, control and disposal wastes shall be cleaned up and containerized daily.

3. Manufacturer's Catalog Data:

   a. HEPA Vacuums.
   b. Respirators.
   c. HEPA filtered negative air machines.
d. LBP Control Chemicals.
e. All other tools or equipment that the contractor plans on using to remove Lead-Containing materials.
f. Instructions: Paint control materials. Include applicable material safety data sheets.

4. Lead-Containing Material Control Plan: Ten (10) days before work starts, submit to the Owner’s Representative for approval a detailed job-specific plan of work procedures to be used in the control and/or removal of lead-containing building materials. The Plan shall include the name of the Competent Person assigned to supervise the operation, a sketch showing the location, size, and details of lead control areas, type of containment materials used, location and details of decontamination rooms, change rooms, shower facilities, and HEPA filtered mechanical ventilation system.

a. Include in the Plan: eating, drinking, smoking and restroom procedures, interface of trades, sequencing of lead related work, collected wastewater and lead paint and/or lead containing material debris disposal plan, air sampling plan, respirators, protective equipment, and a detailed description of the method of containment of the operation to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded outside of the lead control area.

b. Include air and wipe sampling, strategy, sampling methodology, frequency, duration of sampling, and qualifications and training of air monitoring personnel in the sampling portion on the Plan.

B. During the Work: TCLP test results, as required to characterize waste for segregation and packaging purposes.

1. Records: Submit completed and signed hazardous waste manifest from treatment or disposal facility.

PART 2 PRODUCTS

2.1 PAINT REMOVAL PRODUCTS

The removal of Lead-Based Paint is not included in the scope of work; therefore, no paint control products are to be used in this project.

PART 3 EXECUTION

3.1 PROTECTION

A. Notification: Prior to work which will disturb lead, all workers are to be notified that components in the building being abated contain lead and have received adequate training under 29 CFR 1926.62.

B. Lead Disturbance Area Requirements: Establish a lead disturbance area as needed.
C. **Protection of Existing Work to Remain**: Perform lead-containing paint and materials control work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, the Contractor will restore it to its original condition.

D. **Boundary Requirements**: Provide physical boundaries around the lead control area by sealing off the area, if determined necessary, and as designated on the approved work plan to ensure that airborne concentrations of lead will not reach thirty micrograms per cubic meter (30 µg/m³) of air outside of the lead control area.

E. **Heating, Ventilating and Air Conditioning (HVAC) Systems**: Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6-mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area as needed.

F. **Change Room and Shower Facilities**: Provide clean change rooms and shower facilities in accordance with requirements of 29 CFR 1926.62 as needed.

G. **Mechanical Ventilation System (if deemed necessary through the lead control work plan)**:
   1. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62.
   2. Contain removal operations by the use of a negative pressure full containment system with at least one change room and with HEPA filtered exhaust, exhausted to the outside of the building. The negative pressure containment shall have a minimum of 6 air changes per hour. The Contractor shall maintain a -0.020 column inches of water pressure differential, relative to outside pressure. This measurement shall be recorded and maintained within the enclosure as evidenced by manometric measurements and maintained around the clock, or until authorization for containment control is obtained from the Owner’s Representative. Hourly readings shall be recorded while lead removal work is being performed. Anytime the negative pressure is less than -0.020 column inches of water pressure differential, relative to outside pressure, all lead control work inside the containment will stop. The work may be restarted only after the negative pressure is restored to a level of -0.020 column inches of water pressure differential or greater, relative to outside pressure.

H. **Personnel Protection**: Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking is not permitted in the lead control area. The Contractor shall provide the appropriate type of respirator to be used by the employees as required by 29 CFR 1926.62.

I. **Warning Signs**: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.
3.2 WORK PROCEDURES

A. The assigned Competent Person shall supervise the demolition work and will be on site anytime work is on-going. This person shall use procedures and equipment required to limit occupational and environmental exposure to lead during demolition activities in accordance with 29 CFR 1926.62, except as specified herein. Dispose of lead-containing materials, any paint chips and associated waste in compliance with applicable Federal, State, and local requirements.

B. Personnel Hygiene: Whenever personnel exist the work area, workers shall perform the following procedures and shall not leave the work until:
   1. HEPA vacuum themselves off;
   2. Remove protective clothing, and place them in an approved impermeable disposal bag;
   3. Change to clean clothes prior to leaving the work area.

C. Monitoring: Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1926.62 and as specified herein.

D. Monitoring during Renovation/Demolition Work: The Contractor shall control the lead airborne levels outside of the work boundary to less than thirty micrograms per cubic meter (30 µg/m³) of air at all times. As a minimum, conduct area monitoring daily on each shift in which renovation/demolition operations are performed in areas immediately adjacent to the work area. If any outside the work boundary lead levels are at or exceed 30 µg/m³ of air, work shall be stopped and the IHC shall immediately correct the condition(s) causing the increased levels and notify the Owner immediately. Work shall resume when approval is given by the Owner.

3.3 CLEANUP

A. Cleanup:
   1. Maintain surfaces of the area free of accumulations of lead-contaminated chips, dust and debris;
   2. Restrict the spread of dust and debris;

3.4 DETERMINATION OF HAZARDOUS WASTE MATERIALS

A. Testing of waste by Toxicity Characteristic Leaching Procedure (TCLP) will be performed by the Owner’s Representative. Sampling of waste products shall be conducted in a representative manner in accordance with EPA Document SW 846 and analyzed performed in accordance with EPA Method 1311. Samples will be collected from each waste category. Results will be supplied to the Contractor.

B. Waste tested which results in a lead content in the leachate of greater than or equal to five parts per million (5 ppm) is to be considered hazardous, handled and disposed of according to local, city, state, and federal regulations. Waste tested which results in a lead content in
the leachate of less than 5 ppm can be disposed of as regular construction waste. In no manner may the components that contain lead-based paint (LBP) shall be recycled and re-deposited on site.

3.5 DISPOSAL

A. Collect all potential lead-contaminated waste, including but not limited to, removed paint chips, architectural components, scrap, debris, bags, containers, equipment, and lead-contaminated clothing.

B. Based upon the nature of this project, hazardous waste disposal as described under RCRA is not anticipated. Once TCLP sampling is performed and results are acceptable, debris may be disposed of as normal construction waste.

END OF SECTION 13 28 02
Note 1: In Most Areas, Multiple Layers of Asbestos Flooring Materials and associated Asbestos Floor Mastics/Leveling Compounds are Present. These Materials May be Present under Partition Walls, Carpet, Fixtures, Cabinets, Lockers, Furniture, etc.

Note 2: The White Mudded Texture Pipe Fitting Insulation was Sampled from the Art Room. This Material May be Present in Other Areas and/or May be Present on Pipe Chases behind Solid Walls and Above Hard Ceilings that were not Accessible to Survey.

Note 3: The White Acoustical Ceiling Plaster is located Above the 1' x 1' Suspended Ceiling Tiles. If the 1' x 1' Suspended Ceiling Tiles are Adhered to the White Acoustical Plaster and Cannot be Removed without Disturbing the White Acoustical Plaster, the 1' x 1' Ceiling Tiles Will have to be Removed as Asbestos-Containing Waste. Other ACMs or Suspect ACMs May be Present above the Plaster Ceilings.

Note 4: The Drywall Wallboard associated with the Asbestos-Containing Joint Compound is also Considered Asbestos-Containing.

Note 5: The Drawing of the Subject Building was Provided by the Client and the Rooms Depicted in the Drawing are not Completely Accurate. A Roof Drawing was not Provided to ECS. This Drawing is not to scale.

Note 6: Various Flooring Materials and associated Mastics/Leveling Compounds
- 4" Brown Cove Base and associated Brown Mastic
- Interior Beige Glass Block Window Glaze (above Suspended Ceiling Tiles)
- White Mudded Texture Pipe Fitting Insulation
- Interior Gray Soffit Cement Board (above Suspended Ceiling Tiles)
- White Acoustical Plaster Ceiling (above Suspended Ceiling Tiles)
- Joint Compound associated with Drywall
- Exterior Residual White and Black Window Caulks
- Exterior Tan Door Caulk
- Exterior Multi-Layered Black Shingling Caulk
- Exterior Dry Stack Tea Concrete Caulk
- Interior Residual Black Tar on Metal Vent
- Exterior Multi-Layered Black Flashing Caulk
- Exterior Gray Soffit Cement Board

Asbestos-Containing Building Materials (ACBMs)