



Liberty Plaza Suites
500 Commerce Street, Hawthorne, NY 10532
Town of Mount Pleasant
Westchester County

SPECIFICATIONS

April 26, 2021
500 Commerce LLC
2034

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**SECTION 00015
LIST OF DRAWINGS**

PART 1 - GENERAL

1.1 DRAWINGS

- A. Drawings dated August 12, 2020, titled:
**Liberty Plaza Suites
500 Commerce Street
Town of Mt. Pleasant
Westchester County, NY**

1.2 LIST OF DRAWINGS

- A. The following Drawings are a part of the Contract Documents by reference:

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ARCHITECTURAL

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A200 EXTERIOR ELEVATIONS
A300 BUILDING SECTIONS
A350 WALL DETAILS
A351 WALL DETAILS
A500 STAIR 'A' PLANS AND SECTION
A501 STAIR 'B' PLANS AND SECTION
A502 STAIR DETAILS
A503 ELEVATOR PLANS & SECTION
A504 ELEVATOR NOTES
A800 PARTITION TYPES
A801 MISC. DETAILS
A802 RCP DETAILS
A850 ROOF DETAILS
A851 ROOF DETAILS
A900 DOOR SCHEDULE
A901 DOOR DETAILS
A910 WINDOW SCHEDULES AND DETAILS

STRUCTURAL

S001 STRUCTURAL GENERAL NOTES
S002 STRUCTURAL FOUNDATION PLAN
S003 STRUCTURAL RETAINING WALL SECTIONS
S004 STRUCTURAL FOOTINGS AND WALL DETAILS
S005 STRUCTURAL SECOND FLOOR PLAN
S006 STRUCTURAL THIRD FLOOR PLAN
S007 STRUCTURAL ROOF FLOOR PLAN

S008	STRUCTURAL STAIRS & ELEVATOR ROOF FLOOR PLAN
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S010	STRUCTURAL ELEVATIONS FRAMES A & B
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SECTION 01010 SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and Specifications, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements:
 - 1. Project work description.
 - 2. Contract method.
 - 3. Permits.
 - 4. Miscellaneous Provisions.
 - 5. Contractor use of premises.

- B. Special definitions:
 - 1. General: Basic contract definitions are included in the Conditions of the Contract.
 - 2. "Owner:" Term used throughout Contract Documents means 500 COMMERCE LLC or its authorized representative.
 - 3. "Indicated": Refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.
 - 4. "Approved": When used in conjunction with the Architect/Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Architect/Engineer's duties and responsibilities as stated in the Conditions of the Contract.
 - 5. "Regulations": Term includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
 - 6. "Furnish": Means pay for, supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
 - 7. "Install": Receive including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and adjust and test for satisfactory performance and operation.
 - 8. "Provide": Furnish and install, complete and ready for the intended use.

9. "Not In Contract": Product and assemblies not in Contract, but which may require provision in the construction for future installation, or installation under separate contract.
10. "Product": Materials, systems, and equipment incorporated in or to be incorporated in the Project.
11. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
12. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
13. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 PROJECT/WORK DESCRIPTION

A. The overall Scope of Work includes the construction of a new 3-story, approximately 36,275 square foot, 16-unit multi-family building. The first floor support a parking garage for 27 vehicles, accessed from Garfield Place and the second and third floors support 12 two-bedroom apartments and 4 one-bedroom apartments. A 10-space surface parking lot is proposed behind the building, accessed from Liberty Street. New utility, storm water management, landscaping and associated site improvements are also proposed.

- B. Work to be done shall be all inclusive and any work not specifically mentioned but reasonably implied shall be included. This includes any patching, painting, and demolition work necessary.

1.4 CONTRACT METHOD

- A. The work shall be constructed as per 500 COMMERCE LLC bid instructions and consist of Work as shown on the Contract Drawings and described in the Specifications.
- B. Before submitting a Proposal, the Contractor shall carefully examine the Drawings and Specifications, visit the site of the work, and become thoroughly familiar with all existing conditions and limitations. The submission of a Proposal will be construed as evidence that such an examination has been made, and later claims for labor or materials required or for difficulties encountered, which could have been foreseen had such an examination been made, will not be recognized.

1.5 PERMITS

- A. Contractor shall obtain the permits from Building Department. Architect/Engineer will provide sealed and signed drawings and documents required for building permit. Contractor shall obtain and pay for all permits required by code or authorities having jurisdiction.

1.6 MISCELLANEOUS PROVISIONS

- A. Indemnification.
 - 1. To the fullest extent permitted by law, the Contractor agrees to indemnify, save harmless and defend 500 COMMERCE LLC, the Architect/Engineer, their officers, partners, directors and employees against loss or expense by reason of the liability imposed by law upon 500 COMMERCE LLC, the Architect/Engineer or the Contractor, their officers, directors, employees and agents for damage because of bodily injuries, including but not limited to death at any time resulting there from, sustained by any person or persons or on account of damage to property arising out of or in consequence of the performance of this Work, whether such injuries to persons or damage to property are due or claimed to be due to any statutory violation or to any negligence of the Architect/Engineer, his or their officers, directors, employees or agents or any other person. The above shall include but not be limited to property damage, injuries and death of any officer, director, employee or agent of the Contractor or his subcontractors at or about the construction site whether or not caused or brought about by any statutory violation, negligent act or breach of duty by or attributable to the Architect/Engineer, their officers, directors and employees.

1.7 CONTRACTOR USE OF PREMISES

- A. Driveways, Entrances and Parking
 - 1. Keep driveways and entrances serving the premises clear and available to the Owner and emergency vehicles at all times.
 - 2. Do not use drives and roads for parking or storage of materials. Schedule deliveries to minimize use of space and time requirements for storage of materials and equipment on site.
 - 3. Coordination of building deliveries, emergency vehicles, building trash pick-up, pedestrian and employee parking will be discussed in the pre-bid walk-through.
 - 4. Deliverables for Contractor shall be addressed to the Contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01010

SECTION 01027 APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.
 - 1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Division 1 Section 01300 - Submittals, for construction schedule and submittal schedule requirements.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. Contractor's Construction Schedule.
 - b. Application for Payment forms, including Continuation Sheets.
 - c. List of subcontractors.
 - d. List of products.
 - e. List of principal suppliers and fabricators.
 - f. Schedule of submittals.
 - 2. Submit the Schedule of Values to the Architect/Engineer at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.
 - 3. Subschedules: Where Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

- B. Format and Content: Use the Project Manual table of contents as a guide to establish the format 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 the Architect/Engineer.
 - c. 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 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.
 - 1) Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items.
 4. Round amounts to nearest whole dollar; the 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. Include requirements for insurance and bonded warehousing, if required.
 6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 7. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be

complete. Include the total cost and proportionate share of general overhead and profit margin for each item.

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 the Contractor's option.

8. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect/Engineer and paid for by the Owner.
1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- B. Payment-Application Times: Each progress-payment date is indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment-Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment.
- D. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Architect/Engineer will return incomplete applications without action.
1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to the Architect/Engineer by a method ensuring receipt within 24 hours. One copy shall be complete, including waivers of lien and similar attachments, when required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Architect/Engineer.

- F. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers for the construction period covered by the previous application.
1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.
 - a. Submit final Applications for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.
- G. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:
1. List of subcontractors.
 2. List of principal suppliers and fabricators.
 3. Schedule of Values.
 4. Contractor's Construction Schedule (preliminary if not final).
 5. Schedule of principal products.
 6. Submittal Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from governing authorities for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction meeting.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire the Owner's insurance.
- H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.
1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 2. Administrative actions and submittals that shall precede or coincide with this application include:

- a. Occupancy permits and similar approvals.
 - b. Warranties (guarantees) and maintenance agreements.
 - c. Test/adjust/balance records.
 - d. Maintenance instructions.
 - e. Startup performance reports.
 - f. Changeover information related to Owner's occupancy, use, operation, and maintenance.
 - g. Final cleaning.
 - h. Application for reduction of retainage and consent of surety.
 - i. Advice on shifting insurance coverages.
 - j. Final progress photographs.
 - k. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- I. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:
1. Completion of Project closeout requirements.
 2. Completion of items specified for completion after Substantial Completion.
 3. Ensure that unsettled claims will be settled.
 4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
 5. Transmittal of required Project construction records to the Owner.
 6. Proof that taxes, fees, and similar obligations were paid.
 7. Removal of temporary facilities and services.
 8. Removal of surplus materials, rubbish, and similar elements.
 9. Change of construction core locks to permanent core.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01027

SECTION 01035 MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section specifies administrative and procedural requirements for handling and processing contract modifications.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01027 - Applications for Payment, for administrative procedures governing Applications for Payment.
 - 2. Division 1 Section 01300 - Submittals, for requirements for the Contractor's Construction Schedule.
 - 3. Division 1 Section 01630 - Product Options and Substitutions, for administrative procedures for handling requests for substitutions made to the Contract.

1.3 MINOR CHANGES IN THE WORK

- A. The Architect/Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on AIA Form G710, Architect's Supplemental Instructions.

1.4 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: The Architect/Engineer will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal requests issued by the Architect/Engineer are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
 - 2. Within 20 days of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect/Engineer for the Owner's review.

- a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
- B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect/Engineer.
1. Include a statement outlining the 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 Contract Time.
 2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Comply with requirements in Section 01630 if the proposed change requires substitution of one product or system for a product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests.

1.5 ADJUSTMENTS

- A. For cost adjustment, base each Change Order Proposal on the difference between the actual amount of work required and the amount of work shown, multiplied by the unit price.
1. Prepare explanations and documentation to substantiate the margins claimed.
 2. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect/Engineer may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
CHANGE ORDER PROCEDURES
- C. Upon the Owner's approval of a Proposal Request, the Architect/Engineer will issue a Change Order for signatures of the Owner and the Contractor on AIA Form G701.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01035

SECTION 01040 PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
 - 1. Coordination.
 - 2. Drawing interpretation and coordination
 - 3. Coordination meetings.
 - 4. Pre-installation meetings
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01200 - Project Meetings, for progress meetings, and preinstallation conferences.
 - 2. Division 1 Section 01300 - Submittals, for preparing and submitting the Contractor's Construction Schedule.
 - 3. Division 1 Section 01600 - Materials and Equipment, for material requirements coordinating and general installation provisions.
 - 4. Division 1 Section 01630 - Product Option And Substitutions, for material requirements and procedures for substitutions.
 - 5. Division 1 Section 01700 - Project Closeout, for coordinating contract closeout.

1.3 SUBMITTALS

- A. Coordination of Submittals: Schedule and coordinate required submittals and administrate as specified under Section 01300.
- B. Coordination Drawings: Prepare and submit Coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
 - 1. Show the interrelationship of components shown on separate shop drawings. Indicate required installation sequences.

2. Refer to Division 15 and Division 16 sections for specific Coordination Drawing requirements for mechanical and electrical installations that are not indicated in this Section.
- C. Staff Names: Within 5 days of Notice to Proceed, submit a list of principal staff assignments, including the superintendent and other personnel in attendance at the Project Site; identify individuals, their duties and responsibilities; list their addresses, telephone numbers, and last four digits of their social security number.
1. Post copies of the list in the temporary field office and at each temporary telephone.

1.4 TIME PROVISION

- A. Contractor is required to submit a progress schedule outlining the dates on which the building will be ready for initiation of the various phases of general construction, mechanical and electrical equipment and material installation. The Contractor shall submit, in graphic form, a schedule of proposed procedures to the Owner for approval in order that the Owner may plan for and accommodate necessary arrangements to permit work to be done. The progress schedule shall indicate the anticipated times when the work of each trade is expected to be started and to be completed. At least once a week during the construction period, the schedule shall be revised and resubmitted to show the dates when the work of each trade actually was begun and completed and any extension to the original schedule approved by the Owner. The schedule shall be submitted by means of a reproducible.

1.5 SPECIAL TIME AND MANNER PROVISION

- A. The Contractor shall furnish all labor and materials in sufficient quantities and in ample time, do all the expediting and scheduling of the work required, and so manage the operation that the work will be completed on time.
- B. Where work is required to be performed on overtime, it shall incorporate related work of all trades including reinstallation or removal of existing items and installation and removal of temporary protection.
- C. All overtime cost required and specified shall be included as part of the Base Bid. Overtime shall be as defined in Article "Working Hours" in Section 01010.
- D. The Owner reserves the right to restrict the overtime to certain hours within these periods of time for any portion of the work.
- E. In areas where the work is to be performed on overtime, the Contractor shall provide temporary lighting required to maintain the existing illumination level for the Owner's use of area during normal working hours.

1.6 COORDINATION

- A. Drawings accompanying these Specifications are intended to indicate general arrangement of work, and except where specific details are shown, the Contractor

shall make all reasonable modifications in arrangement, without cost to the Owner, as required for proper execution of the work and/or to avoid conflicts with existing site work, construction, piping, electrical work, ductwork, equipment, etc.

- B. Contractor has authority and responsibility for overall coordination of Work and to recognize areas where:
 - 1. Potential conflict may occur.
 - 2. Field Coordination Drawings are required
 - 3. Maintain coordination drawings up-to-date in field office.

- C. Coordinate scheduling, submittals, and requirements of specification Sections to assure efficient and orderly installation of interdependent construction elements for proper installation, connection and operation.
 - 1. Schedule construction operations in the 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 accessibility for required maintenance, service, and repair.
 - 3. Make provisions to accommodate items scheduled for later installation.
 - 4. Make reasonable modifications in arrangement without additional cost to the Owner.

- D. Installing entities shall modify installations to eliminate conflicts and achieve effective coordination of system and Work.

- E. If Field Coordination Drawing indicates conflict, which may not be reconciled without modifying space or design provisions, Architect/Engineer will review coordination drawings to determine if design modifications are required.

- F. Failure to exercise coordination responsibilities waives Contractor's claims for an increase in the Contract Sum, if design modifications were required to resolve conflicts, which might have been avoided by complying with requirements of this Section.

- G. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of construction schedules.
 - 2. Installation and removal of temporary facilities.
 - 3. Preparation of submittal schedules.
 - 4. Delivery and processing of submittals.
 - 5. Progress coordination meetings.
 - 6. Project close-out activities.

- H. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.

1.7 DRAWING INTERPRETATION AND COORDINATION

- A. Drawings are diagrammatic and indicate the general arrangement of system and equipment, unless where specific details are shown or indicated by dimensions.
 - 1. Plans are intended to show size, capacity, approximate location, direction and general relationship of one work phase to another, but not to exact detail or arrangement.
 - 2. For locations of building elements and existing installations perform field measurements to verify exact location and incorporate in coordination and shop drawings submittals.
 - 3. Follow routing for pipes, ducts and wiring, as closely as practicable; place runs parallel with line of building. Utilize space efficiently to maximize accessibility for other installations, maintenance and repairs.
- B. Each subcontractor shall provide Contractor with complete information, including drawings of openings, chases and recesses required, indicating correct locations, dimensions and other special conditions.
- C. Provide Field Coordination Drawings coordinated with various trade installation including subcontractors, separate contractors and Owner's existing conditions as applicable.
 - 1. Prepare drawings at appropriate scale to show where conflicts are likely to occur because of tight system and space relationships.
 - 2. Drawing type: Reproducible transparencies
 - 3. Use sheet metal field installation drawings as background drawing with other trades of work adding information to this background.
 - 4. Indicate sizes and location of equipment, include elevations and sections as required to show sufficient detail of coordination
 - 5. Indicate area of conflict and coordinate revisions until conflicts are resolved.
- D. File and maintain Coordination Drawings in field construction office for reference and use by subcontractors and other authorized people, Owner, Architect/Engineer, and code enforcing personnel.
- E. In finished areas, unless otherwise indicated, conceal pipes, ducts, and wiring within construction.
 - 1. Coordinate locations of plumbing and electrical fixtures and electrical outlets with finish elements.
- F. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

- G. Room numbers and equipment identification indicated on Contract Documents are for coordination purposes. Coordinate final room numbers and equipment identification with Owner.
 - 1. Coordinate and record final room numbers and equipment identification on Record Drawings.
- H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect/Engineer for final decision.

1.8 COORDINATION MEETINGS

- A. Contractor shall preside at Project Coordination Site Meetings, record minutes and distribute copies of minutes within 4 days after meeting date to Owner, Architect/Engineer, other participants and those affected by decisions made.
 - 1. Schedule coordination meetings every two weeks or as needed in the temporary field office at the Project site.
- B. Schedule field coordination meetings for review of field coordination drawings and field coordination problems, with participation of Contractor's Job Superintendent and subcontractors affected by proceeding of the meeting. Representatives shall be persons familiar with Project and authorized to conclude matters relating to coordination progress. Any decision reached at a job coordination meeting shall be binding on a subcontractors affected by proceeding, whether or not he or his representative is present at such meeting.
 - 1. When requested by Contractor, Owner and Architect/Engineer may attend coordination meetings.

1.9 PRE-INSTALLATION MEETINGS

- A. When required in individual Specification Section, Contractor shall convene pre-installation meeting at job site prior to commencing work of Section.
- B. Require attendance of parties directly affecting, or affected by, work of specific Section.
- C. Contractor shall notify Owner and Architect/Engineer in advance of meeting date.
- D. Contractor shall prepare agenda, preside at meeting, record minutes, and distribute copies after meeting to participants.
- E. Attendees: The 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.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation meetings, including requirements for the following:
 - a. Possible conflicts.
 - b. Compatibility problems.
 - c. Manufacturer's recommendations.
 - d. Warranty requirements.
 - e. Compatibility of materials.
 - f. Acceptability of substrates.
 - g. Temporary facilities and protection.
 - h. Space and access limitations.
 - i. Inspecting and testing requirements.
2. Record significant discussions and agreements and disagreements of each meeting. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect/Engineer.
3. Do not proceed with the installation if the meeting cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the meeting at the earliest feasible date.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01040

SECTION 01045 CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for cutting and patching.
 - 2. Cutting several parts to integrate with other work.
 - 3. Uncovering work to install ill-timed work.
 - 4. Removing defective or non-conforming Work and installation of new.
 - 5. Providing openings in non-structural and structural elements for penetration of mechanical and electrical Work.
 - 6. Penetrations thru existing structure in non-structural and structural elements.
- B. The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01040 – Project Coordination, for coordination with other construction activities.
 - 2. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 SUBMITTALS

- A. Cutting and Patching Procedure: Where approval of procedures for cutting and patching is required before proceeding, submit written procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:
 - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
 - 2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
 - 3. List products to be used and firms or entities that will perform Work.
 - 4. Indicate dates when cutting and patching is to be performed.
 - 5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by the Architect/Engineer to proceed with cutting and patching does not waive the Architect's/Engineer's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.
8. Submit separate MOP (Methods of Procedures) for approval.

1.4 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load carrying capacity or load deflection ratio. Submit proposal and obtain written approval from the structural engineer before cutting and patching of following structural elements:
1. Foundation construction.
 2. Bearing and retaining walls.
 3. Structural concrete.
 4. Structural steel.
 5. Lintels.
 6. Structural decking.
 7. Stair systems.
 8. Miscellaneous structural metals.
 9. Equipment supports.
 10. Piping, ductwork, vessels, and equipment.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety. Submit proposal and obtain written approval of proposal before cutting and patching the following operating elements or safety related systems:
1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Water, moisture, or vapor barriers.
 4. Membranes and flashings.
 5. Fire protection systems.
 6. Noise and vibration control elements and systems.
 7. Control systems.
 8. Communication systems.
 9. Conveying systems.
 10. Electrical wiring systems.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Owner and Architect's/Engineer's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching.

1. Matching existing work and materials; means provide **new** materials and assemblies identical in composition, function, design, appearance, performance and finish as **existing** materials and assemblies.
2. Remove and replace Work cut and patched in a visually unsatisfactory manner and install new.
3. Pre-emption is denied to the Contractor, and the right of approval is solely vested with the Architect/Engineer and the Owner.

1.5 WARRANTY

- A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
 1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

- A. Perform drilling, cutting, chopping, and boring on floors, walls, slabs and ceilings as scheduled with Owner.
 1. Notify Owner minimum 48 hours before performing the proposed drilling, cutting, chopping, and boring.
- B. Temporary Support: Provide temporary support of Work to be cut to assure structural integrity of Work and surroundings.

- C. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- E. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
 - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily provide adequate protection at openings when not in use.
 - 2. To avoid marring existing finished surfaces , cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
 - 4. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall

- coverings and replace with new materials, if necessary to achieve uniform color and appearance.
- a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken area containing the patch, after the patched area has received primer and second coat.
4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.
- D. Penetrations Thru Existing Structure - Drilling: Before cutting, drilling or core drilling, of existing concrete or masonry walls, (when possibility of rebar exists) perform Ground Penetrating Radar (GPR) survey to locate and identify conduits, pipes or rebar before a single hole is drilled.
1. Provide survey, within 24 inch by 24 inch square area, only at locations proposed for core drilling through existing slab.
 2. For core drilling only dry core equipment with vacuum attachment is permitted.
- E. Rated Surfaces: Where walls, floors or other surfaces to be cut and patched have fire-resistance or sound transmission ratings, restore rating in conformance with governing standards.

3.4 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01060 REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Applicable codes and regulations.
 - 2. Building element ratings/UL assemblies.

1.3 APPLICABLE CODES AND REGULATIONS

- A. Contract Documents incorporate and Project is governed by requirements of the regulatory agencies summarized in this Section.
- B. Publication Dates: Comply with the codes in effect as of the date of the Contract Documents, unless date of issue of applicable code is indicated.
- C. Do not perform Work, which is known to be, or which the Contractor or subcontractor is in a position to know, is contrary to applicable regulatory requirements which include, but may not be limited to the following:
 - 1. 2020 Building Code of NYS.
 - 2. 2020 Plumbing Code of NYS.
 - 3. 2020 Mechanical Code of NYS.
 - 4. 2020 Fuel Gas Code of NYS.
 - 5. 2020 Fire Code of NYS.
 - 6. 2020 Energy Conservation Construction Code of NYS.
 - 7. 2010 ADA Standards for Accessible Design.
 - 8. HUD FHA Regulations and Guidelines/ ICC A117.1-2017 Standard for Accessible and Usable Buildings and Facilities.
 - 9. Town of Mt. Pleasant, NY Adopted Codes with Current Amendments.
 - 10. Design Criteria for the Town of Mt. Pleasant.

1.4 BUILDING ELEMENT FIRE RATING

- A. Assembly/Product Qualification: Do not substitute the products of manufacturers, which have already been tested and listed in UL assemblies, unless otherwise approved by the code official having jurisdiction.

- B. Finish Material Ratings: Comply with NFPA 101 for flame spread, fuel contribution, and smoke and gas generation, with Class A minimum ratings in all spaces used for egress. Comply with applicable codes for finishes in other spaces.

1.5 SPECIAL FEES, PERMITS AND TAXES

- A. Arrange and pay for all required fees, permits and taxes.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01060

SECTION 01200 PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
 - 1. Pre-construction meetings.
 - 2. Job progress meetings
 - 3. Special meetings.
 - 4. Inspection tours.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01040 - Project Coordination, for coordination meetings, pre-installation conferences, and coordinating project with other construction activities.
 - 2. Division 1 Section 01300 - Submittals, for submitting the Contractor's Construction Schedule.
 - 3. Division 1 Section 01360 – Methods of Procedure, for special requirements.
- C. Related Items: Contractor's relations with his subcontractors and materials suppliers, and meetings relative thereto, are the Contractor's responsibility and are not part of project meetings content.

1.3 QUALITY ASSURANCE

- A. Persons designated by the Contractor to attend and participate in project meetings shall have all required authority to commit the Contractor to solutions as agreed upon in the Agreement.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 LOCATION OF MEETINGS

- A. Meetings for progress of the Work will be held every two weeks or as directed by Owner in the temporary field office at the Project site.

3.2 ATTENDANCE

- A. Attendance Required: Authorized representatives of the Owner, Architect/Engineer, and their consultants; the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
 - 1. Any decision reached at a job meeting shall be binding on a Contractor, whether or not he or his representative is present at such job meeting.

3.3 MINUTES OF MEETING

- A. A representative of the Architect/Engineer will preside over meetings, transcribe and distribute minutes of all job meetings, clearly indicating the action taken and the follow-up required by each party.
 - 1. Minutes shall include outstanding items from previous meetings and their stage of resolution.
 - 2. All minutes shall be of consistent format for record keeping purposes.
 - 3. Contractor to prepare and distribute meeting minutes to attendees.
 - 4. Contractor shall distribute other copies to subcontractors at his own discretion.

3.4 PRE-CONSTRUCTION CONFERENCE

- A. Schedule a pre-construction conference before starting construction, at a time convenient to the Owner and the Architect/Engineer, but no later than 15 days after execution of the Agreement. Hold the conference at the Project Site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
- B. Minimum Proposed Agenda: Discuss items of significance that could affect progress, including the following:
 - 1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractor's and material suppliers.
 - 2. Tentative construction schedule.
 - 3. Critical work sequencing.
 - 4. Access to building.
 - 5. Procedures for processing field decisions and Change Orders.
 - 6. Procedures for processing Applications for Payment.

7. Distribution of Contract Documents.
8. Submittal of Shop Drawings, Product Data and Samples.
9. Preparation of record documents.
10. Temporary facilities and services.
11. Office, work and storage areas.
12. Equipment deliveries and priorities.
13. Procedures for safety and first aid, security quality control, use of the premises, housekeeping, parking availability.
14. Working hours.

3.5 PROGRESS MEETINGS

- A. Conduct progress meetings at the Project Site every two weeks or as directed by Owner. Notify the Owner and the Architect/Engineer of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Minimum Proposed Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project. Review the present and future needs of each entity present:
 1. Contractor's Construction Schedule: Review progress since the last meeting.
 - a. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule.
 - b. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so.
 - c. Review whether schedule revisions are required to assure that current and subsequent activities will be completed within the Contract Time.
 2. Interface requirements.
 3. Sequences.
 4. Status of submittals.
 5. Deliveries.
 6. Off-site fabrication problems.
 7. Site utilization.
 8. Working hours.
 9. Hazards and risks.
 10. Quality and work standards.
 11. Change Orders.
 12. Documentation of information for payment requests.
 13. Develop corrective measures and procedures to maintain planned construction schedule.
- C. Distribution: After each meeting, Architect/Engineer will distribute minutes of the meeting to each party present, include a brief summary, in narrative form, of progress since the previous meeting and report.

3.6 SPECIAL MEETINGS

- A. Special meeting may be called as required, to resolve construction problems.

3.7 INSPECTION TOURS

- A. If requested by Architect/Engineer, Contractor shall be prepared to show and explain his job progress throughout to the Inspection Parties of the Owner.

END OF SECTION 01200

SECTION 01300 SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:
 - 1. Contractor's Construction Schedule.
 - 2. Submittal Schedule.
 - 3. Schedule of Values.
 - 4. Products List.
 - 5. Shop Drawings.
 - 6. Product Data.
 - 7. Samples.
 - 8. Substitution Request Submittal.
 - 9. List of Subcontractors.
 - 10. Security List.
 - 11. Operating and Maintenance Manuals.
 - 12. Record Drawings.
 - 13. Weekly Construction Reports.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01027 - Applications for Payment, specifies requirements for submittal of the Schedule of Values.
 - 2. Division 1 Section 01040 – Project Coordination, specifies requirements governing preparation and submittal of required Coordination Drawings.
 - 3. Division 1 Section 01200 - Project Meetings, specifies requirements for submittal and distribution of meeting and conference minutes.
 - 4. Division 1 Section 01360 - Methods of Procedure, specifies procedures and requirements for submittal.
 - 5. Division 1 Section 01400 - Quality Control, specifies requirements for submittal of inspection and test reports.
 - 6. Division 1 Section 01700 - Project Closeout, specifies requirements for submittal of Project Record Documents and warranties at project closeout.

1.3 SUBMITTAL PROCEDURES

- A. General: Contractor shall review approve and submit subcontractor's shop drawings, product data and samples prior to submittal to Architect/Engineer. Contractor shall stamp each copy with his review stamp and action. **All submittals without Contractor's Review and Stamp with appropriate Action will be rejected.**
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 3. The Architect/Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
1. Allow five working days for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect/Engineer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
 2. If an intermediate submittal is necessary, process the same as the initial submittal.
 3. Allow five working days for reprocessing each submittal.
 4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect/Engineer sufficiently in advance of the Work to permit processing.
- D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide a space approximately 4-inches x 5-inches on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 2. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect/Engineer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.

- f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
3. Provide at least two copies of each submittal for record keeping purposes.
 4. Record deviations from Contract Document requirements, if any, including minor variations and limitations. Include Contractor's stamp indicating information complies with Contract Document requirements.
 5. Submittals indicating less than complete review by Contractor will be returned for Contractor's compliance without Architect/Engineer's review.
- E. Submittal Transmittal: Transmit each submittal from Contractor to Architect/Engineer using a transmittal form of type approved by Architect/Engineer. Submittals received from sources other than the Contractor will be returned without action.
1. Faxed submittals are not permitted, and will not be reviewed.
- F. Print and distribute copies to the Architect/Engineer, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Prepare a fully developed, computer generated, horizontal bar-chart type Contractor's Construction Schedule, using "Microsoft Project" software. Proceed with the preparation of Contractor's Construction Schedule immediately following Notification of Contract Award. Submit completely developed schedule to Architect/Engineer and Owner at preconstruction meeting.
1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the Schedule of Values.
 2. Within each time bar indicate estimated completion percentage in 10-percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
 3. Coordinate the Contractor's Construction Schedule with the Schedule of Values, List of Subcontractors, Submittal Schedule, progress reports, payment requests and other required schedules and reports.
 4. Indicate important stages of construction for each major portion of the Work, including testing and installation.
 5. Indicate completion of the Work in advance of the date established for Substantial Completion.
 6. Prepare the Schedule on a sheet, or series of sheets, of stable transparency or other reproducible media of sufficient width to show data clearly for the entire construction period.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.

8. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.
 9. No payment will be made to Contractor until complete schedule has been received and accepted by Owner and Architect/Engineer.
- B. Submittal and Distribution: Submit the preliminary issue of the schedule for review by Owner and Architect/Engineer. Revise as required with Architect/Engineer's and Owner's input. When revised schedule is accepted by Owner and Architect/Engineer, submit hard copy to Architect/Engineer and Owner and post Project Construction Schedule in field office. Distribute copies to principal subcontractors and suppliers or fabricators, and others with a need-to-know schedule responsibility.
1. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- C. Schedule Updating: Update initial schedule throughout construction period. Revise schedule and issue the updated schedule concurrently with the report of each Project meeting.

1.5 SUBMITTAL SCHEDULE

- A. Concurrent with preparation of Contractor's Construction Schedule, prepare complete Schedule of Submittals. Submit complete Schedule of Submittals at preconstruction meeting, concurrent with Construction Schedule. Prepare schedule in chronological order according to specification section numbers.
1. Coordinate submittal schedule with the list of subcontractors, schedule of values and the list of products as well as the Contractor's construction schedule.
 2. No payment will be made to Contractor until complete Schedule of Submittals has been received and accepted by Owner.
- B. Distribution: Following response to initial submittal, print and distribute copies to the Architect/Engineer, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
1. When revisions are made, distribute to the same parties and post in the same locations.
 2. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 SCHEDULE OF VALUES

- A. A cost breakdown (schedule of values) using AIA document G703 shall be submitted to the Architect/Engineer and the Owner prior to the first Application for Payment.
- B. Prepare schedule of values in chronological order according to specification section numbers.

1.7 PRODUCTS LIST

- A. Products List: Submit list of all products and manufacturers proposed for use on the project within ten days after receipt of Notice to Proceed. List shall be referenced to Specification Sections and Drawings. Clearly indicate deviations from specified requirements. Attach separate list of proposed product substitutions.

1.8 SHOP DRAWINGS

- A. Submit shop drawings where required by individual Specification Sections.
- B. Do not reproduce Contract Documents or copy standard information for use as shop drawings. Verify field measurements prior to preparation of Shop Drawings.
- C. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Standard information prepared without specific reference to the Project is not considered Shop Drawings. Verify field measurements prior to preparation of shop drawings.
- D. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 - 1. Dimensions.
 - 2. Identification of products and materials included.
 - 3. Materials Safety Data Sheets (MSDS).
 - 4. Compliance with specified standards.
 - 5. Notation of coordination requirements.
 - 6. Notation of dimensions established by field measurement.
 - 7. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2-inches x 11-inches but no larger than 36-inches x 48-inches.
- E. Submittal Requirements: Submit one electronic copy of each submission to Dimovski Architecture PLLC, Attention: Meghan Mellina at m.mellina@dimovskiarchitecture.com. Dimovski Architecture will log and send to appropriate discipline for approval.
 - 1. One approved copy shall be kept on site at all times.

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2. Do not use Shop Drawings without appropriate final stamp indicating action taken in connection with construction.
- F. Each item shall be clearly identified as to proposed application. Where items of specified material and equipment are assembled to make up a larger apparatus, Contractor shall submit for approval, the manufacturer's or fabricator's assembly shop drawings. Such drawings shall include dimensions and all essential details of arrangement, construction, assembly and connections. Wiring diagrams for special signal and control systems shall also be submitted for approval.
1. When directed by the Owner, the Contractor shall submit in approved form for the record, a Certificate of Compliance with a cited code or standard for the materials and equipment designated. Such certificates may be accepted in lieu of samples.
- G. Materials, fixtures or equipment submitted for approval, which are not in accordance with the Contract Documents requirements, will be rejected. Shop drawings marked "Make Correction Noted," "Revise and Resubmit" or "Rejected" shall be revised and resubmitted until marked "No Exception Taken". Items installed without approved shop drawings may require removal or replacement at Contractor's expense.
- H. The Contractor is required to maintain four copies of approved shop drawings for insertion into the O & M Manuals.
- I. As part of the coordination work required for the Contractor, installation drawings shall be prepared by the Contractor as necessary. It is intended that these drawings be used to coordinate the work of the various trades and to clarify details of proposed assembly, erection and installation.
- J. Where indicated in these Specifications or on the Drawings, installation drawings shall be submitted for approval or record. Any installation drawings will be submitted to the Architect/Engineer for comment and approval when an installation condition or problem arises which the Contractor wishes the Architect/Engineer to review.
- K. Coordination drawings are a special type of Shop Drawing; preparation of coordination Drawings is specified in Section 01040 - Project Coordination.

1.9 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings. "Include the following information:
1. Manufacturer's printed recommendations.
 2. Compliance with recognized trade association standards.

3. Compliance with recognized testing agency standards.
 4. Application of testing agency labels and seals.
 5. Notation of dimensions verified by field measurement.
 6. Notation of coordination requirements.
 7. Notation of Material Safety Data Sheets (MSDS).
- B. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
- C. Submittals: Submit one electronic copy of each required submittal. The Architect/Engineer will review and stamp with action and return electronically.
- D. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities.
1. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
 2. Do not permit use of unmarked copies of Product Data in connection with construction.
- E. Material Safety Data Sheets (MSDS):
1. MSDS shall be delivered to the Owner at the beginning of the project and at least 2 days prior to the delivery. Copies shall be submitted to Architect/Engineer at the same time.
 2. Applicable MSDS (Material Safety Data Sheets) for all hazardous and controlled substances shall be delivered to the Owner at the same time that the materials are delivered to the site.

1.10 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect/Engineer's Sample. Include the following:
 - a. Generic description of the Sample.
 - b. Sample source.
 - c. Product name or name of manufacturer.
 - d. Compliance with recognized standards.
 - e. Availability and delivery time.
- B. Submit Samples for review of kind, color, pattern, and texture, for a final check of characteristics with other elements, and for comparison of characteristics between final submittal and actual component as delivered and installed.

1. Submit units identical with final condition of proposed material or products for the work. Include "range" samples (not less than three units) where unavoidable variations must be expected and describe or identify variations between units of each set.
 2. Refer to other Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, operation, and similar construction characteristics.
- C. Preliminary Submittals: Where samples are for selection of color, pattern, texture or similar characteristics from range of standard choices, submit full set of choices for material or product.
1. Preliminary submittals will be reviewed and returned with Architect/Engineer's mark indicating selection and other action.
- D. Submittals: Except for samples illustrating workmanship, fabrication techniques, operation and similar characteristics, submit 3 (three) sets; one will be returned marked with action taken.
1. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
- E. Schedule: Significant samples submittals shall be included in the Contractor's Construction Schedule.
- F. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 2. Process transmittal forms to provide a record of activity.

1.11 LIST OF SUBCONTRACTORS

- A. The Contractor shall submit a list of all subcontractors who will be working in or around the building during the course of the job. The submittal shall include the name, address and telephone number of the subcontractors. The subcontractors should not enter the work site until the Contractor receives written approval from the Owner.
- B. When selecting subcontractors, their experience, reliability and professional work habits shall be the overriding criteria. The Owner reserves the right to approve or reject all subcontractors.

1.12 SECURITY LIST

- A. For the purposes of security, the Contractor shall submit, to the Owner a complete list of employees who will be entering the building. The list shall be submitted on company letterhead with employee's complete name and the last 4 digits of their social security number.

1.13 OPERATING AND MAINTENANCE MANUALS

- A. Furnish to the Architect/Engineer, Operating and Maintenance Instructions for each piece of equipment and each device.
 - 1. The instructions shall provide detailed description of the operation and maintenance of the equipment or device and shall include manufacturers' literature, detailed wiring diagrams, device internal wiring diagrams, device internal wiring diagrams and descriptive literature.
 - 2. The instructions shall be furnished to the Architect/Engineer 30 days prior to the completion of the building work.
 - 3. The instructions shall be submitted initially as a rough draft for approval.
 - 4. After the required corrections have been made, four (4) sets in loose-leaf hardback covers shall be furnished to the Architect/Engineer.
- B. All approved shop drawing submittals, acceptance tests reports and warranties are to be included within the O&M Manuals.

1.14 RECORD DRAWINGS

- A. The Contractor shall maintain an accurate record of all work as actually installed. This record shall be kept current and shall be kept available at the site for inspection. The Contractor shall utilize the contract design drawings for marking up the work as installed. Upon completion of the work, and before final payment is authorized, two sets of clearly marked prints of as-built conditions, with signed certification of accuracy shall be delivered to the Architect/Engineer.

1.15 ARCHITECT/ENGINEER'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, Architect/Engineer will review each submittal, mark to indicate action taken, and return.
 - 1. Compliance with specified characteristics is Contractor's responsibility.
- B. Action Stamp: Architect/Engineer will mark action stamp on each Submittal Cover Sheet as follows, to indicate action taken:
 - 1. **"NO EXCEPTION TAKEN"** - Indicates submittal conforms to "design intent" of the Work. Contractor may proceed with fabrication, procurement and installation.
 - 2. **"MAKE CORRECTIONS NOTED"** - Indicates submittal, after indicated corrections are made, would conform to the "design intent" of the Work.

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- Contractor at their discretion may proceed with fabrication, procurement and installation, provided that the Contractor adheres to the corrections noted. Resubmit "Make Correction Noted" for Architect/Engineer final review to conform that revisions have been incorporated, understood and made, and accepted with "No Exception Taken".
3. **"REVISE AND RESUBMIT" or "REJECTED"** - Indicates submittal does not conform to "design intent" of the Work. Resubmittal is required. Contractor may not proceed with fabrication, procurement and installation, until resubmittal is accepted with "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED" action as described above.
 4. Stamp Note: Reviewing is only for conformance with design concept of the project and compliance with the information given the Contract Documents. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the site for information as it pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction and for coordination of the Work of all trades. Any corrections on this drawing shall not be deemed an order for extra work.
 5. Do not permit submittals marked "Revise and Resubmit," or "Rejected," to be used at Project site, or elsewhere where Work is in progress.
 6. Other Action: Where submittal is primarily for information or record purposes, special processing or other activity, submittal will be returned, marked "Action Not Required."

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01300

**SECTION 01360
METHODS OF PROCEDURE**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section specifies administrative and procedural requirements for MOP (Methods of Operating Procedures) submittals.
- B. Meetings shall be scheduled and held when a work activity will result in large or multiple MOP's. Attendees should include individuals from organizations that will be impacted by the work done in the building. This meeting shall also include discussions on the contingency plans that are a required part of every MOP.
- C. Any work requiring an MOP will be performed "off hours" (12:01 AM to 6:00 AM).

1.3 SUBMITTAL PROCEDURE

- A. MOP's shall be submitted to the Owner for approval at least 7 calendar days in advance of proposed start date. Copies shall be submitted to Architect/Engineer and other appropriate parties at the same time. Revisions to MOP's, as required by Owner and Engineer's review, shall be made and revised copies submitted in time to allow 3 days for approval.
- B. The Contractor shall be responsible for providing detailed Methods of Procedure (MOP) for work, which involves the following:
 - 1. Any procedure, which may affect the life safety of any individual.
- C. Work shall not proceed on any facet of the work involving any MOP if an approved and signed MOP is not posted in the work area. The Owner shall have the right to stop work if the MOP procedure is not adhered to.
 - 1. The Contractor shall identify any down time (48 hours prior notice required.)
- D. The Contractor shall submit a list of all tasks requiring methods of procedure and a general schedule for performing MOP's.
 - 1. Ensure that the submitted MOP's contain the following items:
 - a. A descriptive title.
 - b. Approval/Acceptance signature lines.

- c. The tentative start/finish date.
 - d. A list of detailed step-by-step activities.
 - e. A contact list.
 - f. When work will be performed.
 - g. Hoisting and hauling route.
 - h. Protection for:
 - 1) Personnel/Tenants.
 - 2) Equipment: Telephone/Computers/Cables
 - 3) Electrical and Mechanical Equipment
 - i. Safety Requirements:
 - 1) Fire protection.
 - 2) Environmental.
 - 3) A back-out plan.
 - j. Testing Methods.
 - k. Special Tenant Needs/Requirements.
 - l. Building Security.
 - m. Weather Protection.
- E. The Contractor shall ensure that a MOP flow chart is developed so that all appropriate parties can be aware of, prepare for, execute, and track MOP's.
- F. The Contractor shall maintain a log to track and document MOP's. The Contractor shall use the MOP checklist flow chart and log to insure MOP has successfully been completed and documented.
- G. The Contractor shall confirm that the Architect/Engineer and other appropriate parties are properly notified so that they may determine whether they will need to observe execution of method of procedure, if required.
- H. Contingency Plans:
- 1. The Contractor shall review the contract document requirements and field verify the existing conditions in order to evaluate any contingency plans. Contingency plan requirements will contain the following:
 - a. If any building system, (power, cooling, heating, etc.) that affects on-site work force, telecommunication systems, computer systems, or the life safety of any personnel is taken out of service for any reason, the Contractor shall be responsible for providing temporary systems or connections to the existing building systems during the period when the system is out of service (some examples of temporary systems are portable generators, air conditions, etc.). A detailed method of procedure shall be provided for this procedure.
- I. MOP's required for this contract, include but are not limited to the following:

1. Protection of network equipment.
2. Any work inside of electrical panels.
3. Any work requiring a shutdown of fire alarm system.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

ATTACHMENTS: - Sample Form for MOP

END OF SECTION 01360

SECTION 01400 QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality-control services.
- B. Quality-control services include inspections, tests, and related actions, including reports performed by Contractor, by manufacturer, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Architect/Engineer and Owner.
- C. Inspection, testing services and acceptance testing are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 - 1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
 - 3. Provisions of this Section do not limit requirements for Contractor to provide quality-control services required by Architect/Engineer, Owner, or authorities having jurisdiction.
- E. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 01045 - Cutting and Patching, for specific requirements for repair and restoration of construction disturbed by inspection and testing activities.
 - 2. Division 1 Section 01300 - Submittals, for specific requirements for development of a schedule of required tests and inspections.
 - 3. Division 1 Section 01360 - Methods of Procedure, for specific requirements for administrative and procedural requirements for methods of operating procedures to ensure continuous operation of the facilities.

1.3 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall arrange and pay for tests, inspections, manufacturer's tests and acceptance testing, and other quality-control services specified in the Contract Documents and required by authorities having jurisdiction. Costs for these services shall be included in the Contract Sum.
1. Where individual Sections specifically indicate that certain independent inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services shall be included in the Contract Sum.
 2. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.
 - a. Where the Owner has engaged a testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless agreed to in writing by the Owner.
 3. Where individual Sections specifically required that certain Manufacturer's tests, inspection and other quality control services are the Contractor's responsibility, the Contractor shall employ the Manufacturer to perform quality-control services. Costs for these services shall be included in the Contract Sum.
- B. Testing Schedule: Contractor shall prepare and maintain detailed schedule of testing, inspections, quality control activity and acceptance testing, using "Microsoft Project" software. Submit completely developed schedule to Architect/Engineer and Owner.
1. Update initial schedule throughout construction period. Revise schedule and issue the updated schedule concurrently with the report of each Project meeting.
 2. Include testing schedule as part of Construction Schedule specified in Section 01300 - Submittals.
- C. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.
1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.

- D. Final Acceptance Testing: Before final completion of Work, Contractor shall conduct final acceptance testing of mechanical and electrical systems and equipment, including inspection list items from earlier inspections, manufacturers testing and other quality control testing during progress of Work that has been completed. Contractor shall notify Owner and Architect/Engineer in advance of scheduled final testing to allow for assignment of personnel to witness final test. Final acceptance testing shall not be conducted without Owner's representatives, Architect/Engineer, subcontractor and manufacturer present.
1. Acceptance testing procedures will be provided by Architect/Engineer prior to scheduling of testing.
 - a. Sample of testing procedures for electrical and mechanical systems are attached at the end of the Section for information only. Not all pages of each document have been attached. Actual length and complexity of this document will vary with the actual scope of required work.
 2. Reinspection Fee: Should status of final acceptance testing require reinspection due to failure of Work to comply with Contract requirements, Owner will deduct amount of Architect/Engineer 's compensation and compensation for Owner's Representatives for each reinspection services, if reinspection will be repeated, from final payment to Contractor.
- E. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
1. Provide access to the Work.
 2. Provide full time non-working superintendent.
 3. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
 4. Provide temporary floor, wall and equipment protection during testing.
 5. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
 6. Provide facilities for storage of test samples.
 7. Deliver samples to testing laboratories.
 8. Provide security and protection of samples and test equipment at the Project Site.
 9. Provide test equipment.
 10. Provide detailed step-by-step Method of Procedure for each inspection, testing, acceptance testing and related services.
- F. Duties of the Testing Agency and Manufacturer: The testing agency and manufacturer engaged to perform inspections, sampling, testing of materials and testing of equipment specified in individual Sections shall cooperate with the Architect/Engineer and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.

1. The agency and manufacturer shall notify the Architect/Engineer and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency and manufacturer is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
3. The agency and manufacturer shall not perform any duties of the Contractor.

1.4 SUBMITTALS

- A. The independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Architect/Engineer and Contractor.
 1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making the inspection or test.
 - f. Designation of the Work and test method.
 - g. Identification of product and Specification Section.
 - h. Complete inspection or test data.
 - i. Test results and an interpretation of test results.
 - j. Ambient conditions at the time of sample taking and testing.
 - k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
 - l. Name and signature of laboratory inspector.
 - m. Recommendations on retesting.
 - n. Identification of test equipment used.

1.5 CONTRACTOR'S QUALITY CONTROL PROGRAM

- A. Develop and maintain Contractor's Quality Control Program to perform inspections and testing of items of Work, including those of subcontractors to ensure conformance to Contract Documents.
- B. Within 30 days of Notice of Award submit quality control plan and list of proposed personnel for Architect/Engineer's information.
- C. Provide appropriate facilities, instruments, and testing devices required for performance of Contractor's quality control and final acceptance testing.
- D. Maintain quality control over suppliers, manufacturers, products, services, site conditions and workmanship, to produce Work of specified quality.

- E. Ensure quality control procedures apply to manufactured and shop fabricated items.
- F. Inspection procedures for Contractor's Quality Control Program.
 - 1. Ensure materials, products and equipment conform to requirements of Contract Documents and submittals have been reviewed by Architect/Engineer as required by Contract Documents.
 - 2. Examine existing areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
 - a. Do not proceed until unsatisfactory conditions have been corrected.
 - 3. Confirm prior Work has been performed to comply with requirements of Contract Documents.
 - 4. Perform inspections on routine basis to ensure continuing compliance with Contract requirements.
 - 5. Arrange for manufacturer's inspections and testing to ensure continuing compliance with Contract requirements.
- G. Reports: Submit in accordance with Section 01300 reports from each inspector and technician noting observation and recommendations made.
 - 1. Indicate non-conforming items with explanation of cause, proposed remedial action, and corrective action taken.

1.6 QUALITY ASSURANCE

- A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.
 - 1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 1 Section 01045 - Cutting and Patching.

- B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.
- C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

3.2 ATTACHMENTS

- A. ATTACHMENT - 1: Sample of testing procedures for electrical systems
- B. ATTACHMENT - 2: Sample of testing procedures for mechanical systems

END OF SECTION 01400

SECTION 01421 REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract and Section 01010 – Summary of Work.
- 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," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- E. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- F. "Provide": Furnish and install, complete and ready for the intended use.
- G. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, 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.
- H. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of **five** previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

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: 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 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 requirements. Refer uncertainties to Architect for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on Project must 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 and make them available on request.
- E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	(888) 293-6498 (202) 512-1530
CRD	Handbook for Concrete and Cement	(601) 634-2355

	Available from Army Corps of Engineers Waterways Experiment Station www.wes.army.mil	
DOD	Department of Defense Specifications and Standards Available from Defense Automated Printing Service //astimage.daps.dla.mil/online	(215) 697-6257
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Defense Automated Printing Service //astimage.daps.dla.mil/online	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MILSPEC	Military Specification and Standards Available from Defense Automated Printing Service //astimage.daps.dla.mil/online	(215) 697-6257
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S." Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
AAADM	American Association of Automatic Door Manufacturers www.aadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202

AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AAN	American Association of Nurserymen (See ANLA)	
AASHTO	American Association of State Highway and Transportation Officials www.aashto.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists (The) www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
ADC	Air Diffusion Council www.flexibleduct.org	(312) 201-0101
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AFPA	American Forest & Paper Association (See AF&PA)	
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association www.ahardbd.org	(847) 934-8800
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute	(859) 288-4960

	www.asphaltinstitute.org	
AIA	American Institute of Architects (The) www.e-architect.com	(202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALA	American Laminators Association (See LMA)	
ALCA	Associated Landscape Contractors of America www.alca.org	(800) 395-2522 (703) 736-9666
ALSC	American Lumber Standard Committee	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANLA	American Nursery & Landscape Association (Formerly: AAN - American Association of Nurserymen) www.anla.org	(202) 789-2900
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts www.aosaseed.com	(402) 476-3852
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(941) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ASCA	Architectural Spray Coaters Association www.ascassoc.com	(609) 848-6120

ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	American Society for Testing and Materials www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industries International) www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (See WCMA)	
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (703) 733-0600
AWPA	American Wood-Preservers' Association www.awpa.com	(817) 326-6300
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)	(616) 285-3963

	www.bifma.com	
CCC	Carpet Cushion Council www.carpetcushion.org	(203) 637-1312
CCFSS	Center for Cold-Formed Steel Structures www.umn.edu/~ccfss	(573) 341-4471
CDA	Copper Development Association Inc. www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 412-0900
CGSB	Canadian General Standards Board www.pwgsc.gc.ca/cgsb	(819) 956-0425
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association (Formerly: National Particleboard Association) www.pbmdf.com	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200

CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(800) 463-6727 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA/TIA	Electronic Industries Alliance/Telecommunications Industry Association www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eifsfacts.com	(800) 294-3462 (770) 968-7945
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
FCI	Fluid Controls Institute www.fluidcontrolsintitute.org	(216) 241-7333
FGMA	Flat Glass Marketing Association (See GANA)	
FM	Factory Mutual System (See FMG)	
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America (Formerly: FGMA - Flat Glass Marketing Association) www.glasswebsite.com/gana	(785) 271-0208
GRI	Geosynthetic Research Institute www.drexel.edu/gri	(215) 895-2343

GTA	Glass Tempering Division of Glass Association of North America (See GANA)	
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (See CSA International)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(508) 394-4424
ICRI	International Concrete Repair Institute (The) www.icri.org	(703) 450-0116
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
IRI	Industrial Risk Insurers www.industrialrisk.com	(800) 243-8308 (860) 520-7300
ITS	Intertek Testing Services www.itsglobal.com	(800) 345-3851 (607) 753-6711

IWS	Insect Screening Weavers Association (Now defunct)	
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LGSI	Light Gage Structural Institute www.loseke.com	(972) 370-0967
LMA	Laminating Materials Association (Formerly: ALA - American Laminators Association) www.lma.org	(201) 664-2700
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
LSGA	Laminated Safety Glass Association (See GANA)	
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(312) 201-0193
MFMA	Maple Flooring Manufacturers Association www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association	(312) 644-6610
MGPHO	Medical Gas Professional Healthcare Organization, Inc. www.mgpho.org	(877) 238-5157 (913) 681-6548
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(614) 228-6194
ML/SFA	Metal Lath/Steel Framing Association (See SSMA)	
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers	(312) 332-0405

	www.naamm.org	
NAAMM	North American Association of Mirror Manufacturers (See GANA)	
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(281) 228-6200
NAIMA	North American Insulation Manufacturers Association (The) www.naima.org	(703) 684-0084
NAMI	National Accreditation and Management Institute, Inc.	(304) 258-5100
NAPM	National Association of Photographic Manufacturers (See PIMA)	
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(414) 248-9094
NCTA	National Cable Television Association www.ncta.com	(202) 775-3669
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(303) 697-8441
NFPA	National Fire Protection Association www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council	(301) 589-6372

	www.nfrc.org	
NGA	National Glass Association www.glass.org	(703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association www.nofma.org	(901) 526-5016
NPA	National Particleboard Association (See CPA)	
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSA	National Stone Association www.aggregates.org	(800) 342-1415 (703) 525-8788
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NTMA	National Terrazzo and Mosaic Association, Inc. www.ntma.com	(800) 323-9736 (703) 779-1022
NWWDA	National Wood Window and Door Association (See WDMA)	
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting and Decorating Contractors of America www.pdca.com	(800) 332-7322 (703) 359-0826
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (508) 230-3516
PGI	PVC Geomembrane Institute //pgi-tp.ce.uiuc.edu	(217) 333-3929

PIMA	Photographic & Imaging Manufacturers Association (Formerly: NAPM - National Association of Photographic Manufacturers) www.pima.net	(914) 698-7603
RCSC	Research Council on Structural Connections www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	Resilient Floor Covering Institute (Contact by mail only)	
RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662
RMA	Rubber Manufacturers Association www.rma.org	(800) 220-7620 (202) 682-4800
SAE	SAE International www.sae.org	(724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 462-1930
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabfurn.com	(843) 689-6878
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIGMA	Sealed Insulating Glass Manufacturers Association www.sigmaonline.org/sigma	(312) 644-6610
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD) - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)	(800) 523-6154

	www.sprayfoam.org	
SPI	The Society of the Plastics Industry www.plasticsindustry.org	(202) 974-5200
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPI/SPFD	The Society of the Plastics Industry Spray Polyurethane Foam Division (See SPFA)	
SPRI	SPRI (Single Ply Roofing Institute) www.spri.org	(781) 444-0242
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSMA	Steel Stud Manufacturers Association (Formerly: ML/SFA - Metal Lath/Steel Framing Association) www.ssma.com	(312) 456-5590
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(800) 837-8303 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, and Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TPI	Truss Plate Institute	(608) 833-5900
TPI	Turfgrass Producers International www.turfgrassod.org	(800) 405-8873 (847) 705-9898

UFAC	Upholstered Furniture Action Council www.ufac.org	(336) 885-5065
UL	Underwriters Laboratories Inc. www.ul.com	(800) 704-4050 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USITT	United States Institute for Theatre Technology, Inc. www.culturenet.ca/usitt	(800) 938-7488 (315) 463-6463
USP	U.S. Pharmacopeia www.usp.org	(800) 822-8772 (301) 881-0666
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (Formerly: AWCMA - American Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4653 (212) 661-4261
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WIC	Woodwork Institute of California www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc.	(708) 799-2300
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www.bocai.org

CABO	Council of American Building Officials (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials (The) www.iapmo.org	(909) 595-8449
ICBO	International Conference of Building Officials www.icbo.org	(800) 284-4406 (562) 699-0541
ICC	International Code Council (Formerly: CABO - Council of American Building Officials) www.intlcode.org	(703) 931-4533
SBCCI	Southern Building Code Congress International, Inc. www.sbcci.org	(205) 591-1853

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-0990
DOC	Department of Commerce www.doc.gov	(202) 482-2000
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
FAA	Federal Aviation Administration www.faa.gov	(202) 366-4000
FCC	Federal Communications Commission www.fcc.gov	(202) 418-0190
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(202) 708-5082

HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley Laboratory (See LBNL)	
LBNL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-5605
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(202) 693-1999
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
TRB	Transportation Research Board www.nas.edu/trb	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01421

SECTION 01500 TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
- B. Temporary construction and support facilities required include but are not limited to:
 - 1. Enclosures and protection.
 - 2. Scaffolding, planking, ladders, chutes, etc.
 - 3. Waste disposal services.
 - 4. Temporary telephone.
 - 5. Use of existing elevators
 - 6. Use of existing hoist.
- C. Security and protection facilities required include but are not limited to:
 - 1. Field office.
 - 2. Barricades, warning signs, lights.
 - 3. Building access limitations.
 - 4. Environmental protection.
 - 5. Equipment protection.
 - 6. Personnel protection.
- D. Use Charges: Owner will pay all use charges for electric, water and heat required for the Work.

1.3 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
 - 1. Building Code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, Fire Department and Rescue Squad rules.
 - 5. Environmental protection regulations.

- B. Standards: Comply with NFPA 241, "Standard for Safeguarding Construction Alteration and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities" and OSHA.
- C. Safety: It is the specific responsibility of Contractor to provide for the safety of his personnel and the public.
 - 1. Personnel engaged in hazardous work shall wear applicable protective equipment as set forth below, and it shall be the responsibility of the Contractor to enforce the use of this equipment at all times.
 - 2. Protective headgear shall be worn at the job site at all times. Protective eyeglasses, goggles or shields shall be worn when personnel are engaged in welding or work involving possible flying particles.
 - 3. The workmen shall also wear protective respirators, aprons, shoes or other applicable protection at appropriate times.
 - 4. Protective headgear, respiratory protection and protection of eyes and heads shall comply with ANSI Standards Z89.1, Z90.1, Z87.1 and Z88.2

1.4 PROJECT CONDITIONS

- A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.
 - 1. In the event of loss or damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.
 - 2. Protect adjacent property outside of contract limit lines. Repair damage to building elements to remain to good as new condition as judged acceptable by Owner.
- B. Use of Existing Facilities and Utilities on Site Include:
 - 1. Only existing toilets designated by the Owner maybe used by Contractor and his employees.
 - 2. Electric power, lighting and water are on site, maybe used by Contractor from locations designated by Owner. Do not overload existing circuits.
 - 3. Owner will designate space inside of the existing building in area to be renovated for Contractor's use as temporary field office and to accommodate his storage and staging requirements if requested by Contractor. Contractor is solely responsible for security of his stored materials and equipment.
 - 4. Do not use temporary facilities and utilities as specified under Section 01010, without express permission from Owner.

- C. Smoking Policy: The Owner has instituted a "NO SMOKING" policy within existing building. Cooperate with The Owner and not allow workers to smoke while in the building.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. If acceptable to the Owner, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Lumber and Plywood: Comply with requirements in Division 6.
 - 1. For job-built temporary shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing and siding.
 - 2. For fences and vision barriers, provide minimum 3/8-inch-thick exterior plywood.
 - 3. For safety barriers, sidewalk bridges and similar use provide minimum 5/8-inch-thick exterior plywood.
- C. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary offices, shops, and sheds.
- D. Paint: Comply with requirements of Division 9 Section "Painting."
 - 1. For job-built temporary shops, sheds, fences and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
- E. Temporary Plastic Sheathing: Wherever polyethylene is used as a tarpaulin or a drop cloth, it shall be non-static fire retardant polyethylene sheathing, .004" thick translucent Rebco as manufactured by Ralph E. Baker Company, Inc., available through Winans-McShane, 59-63 Mine Brook Road, Bernardsville, New Jersey 07924, telephone (908) 953-0200, or approved equal. The product must be identified by one inch high trademarks and 3/4" letters printed continuously along one edge of the sheet in a contrasting color and reading as follows: REBCO FIRE RETARDANT PLASTIC SHEATHING AND ANTI-STATIC GROUNDING AT EQUIPMENT.
- F. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- G. Walk-off mats: Provide tacky mats at each entrance to construction area, to prevent spread off dust and dirt into adjacent area. Hold mats in place with two-way tape on the underside that attaches the mat to the floor.

- H. Netting: Premium Grade Debris Netting Type 4X4 Fluorescent Orange, 4.0 warp/4.2 fill mesh; 0.046 warp/0.0462 fill yarn diameter; 4.9 oz/sq. yd mesh weight. Manufactured by PearlWeave Safety Netting Corp., New York, NY tel. 1-800-732-7566.
- I. Hardboard: ANSI A 135.4, pressed wood fibers with resin binder compressed to minimum 66 pounds per square foot, with smooth finish on both side.
- J. Water: Provide potable water approved by local health authorities.
- K. Open-Mesh Fencing: Provide 0.120-inch-thick, galvanized 2-inch chain link fabric fencing 6 feet high with galvanized barbed-wire top strand and galvanized steel pipe posts, 1-1/2 inches I.D. for line posts and 2-1/2 inches I.D. for corner posts.

2.2 EQUIPMENT

- A. 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.
 - 1. Use GFI adapter when using power tools.
- B. Dumpsters: Size and type required or directed by the Owner.
- C. Scaffolding, Planking, Ladders, Chutes, Etc.: Provide scaffolding, planking, ladders, chutes, etc. fabricated from sound materials and of adequate dimension for the intended use. Components shall be properly supported, braced, tied, and arranged to ensure absolute safety for those using the scaffolding and sufficient to safely withstand all loading and stress. Scaffolding or bracing shall not puncture, scar, or damage walls or other construction. Ladders shall be of sound materials and free of defects that would impair their strength.
- D. Temporary Telephones: Arrange for the local telephone company to install separate temporary telephone and fax line numbers service to project field office.
 - 1. Provide telephones and fax machine for field office.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed.

3.2 FIELD OFFICE

- A. Owner will provide Contractor with space inside of the existing building for Contractor's field office. Contractor is solely responsible for security of his stored materials and equipment.
- B. Contractor shall furnish and equip office as follows:
 - 1. Office desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.
 - 2. Temporary Telephones:
 - a. At each telephone, post a list of important and emergency telephone numbers.
 - b. Provide separate telephones and fax machine for field office.
- C. Maintain field office for duration of the project. Remove field office when directed by Owner.

3.3 TEMPORARY UTILITY INSTALLATION

- A. Temporary Lighting: Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Temporary Protections: Provide all temporary protection, including planking, barricades, signs, lanterns, etc., necessary to protect personnel and the public from equipment and construction operations. Take all required measures to protect building (contents, surfaces, or materials) and site from damage of any kind when performing the Work.
 - 1. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
 - 2. Provide complete restoration of areas damaged due to work under the Contract, to a condition equal to or similar to that existing before damage or injury. Restoration shall include repairing, rebuilding, or replacing damaged items at Contractor's expense.
 - 3. Provide weatherproof closures for temporary openings located on exterior roof and walls to protect interior from weather-related damage.
 - 4. Protect finished surfaces, including jambs and soffits or opening used as passageways, through which equipment and materials are handled.
 - 5. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.
 - 6. In the event of damage, promptly make replacements and repairs with the approval of the Architect and at no additional cost to the Owner.

7. Additional time required to secure replacements and to make repairs would not be considered by the Architect to justify an extension in the contract Time of Completion.
- B. Security Enclosure and Lockup: Install substantial temporary enclosure of construction areas. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
 - C. Building Access Limitations and Security Provisions: Coordinate with Owner for building access limitations and security provisions required.
 1. Take all necessary measures to keep building secure at all times. Building shall be closed and securely locked during all non-working hours.
 2. Contractor shall coordinate with Owner and shall provide all security measures as may be required during construction to ensure the safety and security of the building at all times.
 - D. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment, which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons in or near the building.
 - E. Special Cleaning and Maintenance:
 1. The Contractor shall provide sufficient numbers of workmen to remove all materials and rubbish due to cutting, altering, patching and demolition, and at all times keep building and surround areas free from rubbish and dirt caused by the Contractor's and/or his subcontractor's employees. During entire progress of work, rubbish removal shall be made as frequently (at least daily) and with such care as is deemed necessary by the Owner.
 - F. Materials and Equipment Access:
 1. The Contractor shall, at his own expense and with the approval of the Owner, make such provision as is deemed necessary to ensure that the required equipment can physically be delivered to its final destination within the building. Such provisions may include the introduction of temporary openings on walls, temporary enlargement of existing openings, or requiring the equipment to be shipped in knocked-down form and assembling the equipment on the job.
 - a. For warranties and equipment handling and installation requirements refer to Section 01600 - Materials and Equipment.

2. The Contractor shall provide protection for all existing floors, walls, ceilings, etc., along the access route and where shown on the Drawings for the duration of the job.
 3. The Contractor shall prepare a schedule of equipment deliveries to the job so that the Owner has a minimum prior notification of 48 hours.
 4. Deliveries shall be made at the building as arranged with the Owner.
- G. Collection and Disposal of Waste: Collect waste from construction areas daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 3 days during normal weather or 1 day when the temperature is expected to rise above 80 deg F. Handle dangerous or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.5 FIRE PROTECTION

- A. Fire Extinguishers:
1. The Contractor shall provide a 2-1/2 gallon gas cartridge type, antifreeze, U.L. approved fire extinguisher for each 1,000 square feet of floor area or fraction thereof. Extinguishers shall be placed on the floor as soon as flammable materials are on the site and until walls are erected, at which time the extinguishers shall be hung on plywood backboards painted red, strapped to walls with centers six feet above floor. The Contractor shall not place materials or equipment where they will obstruct access to fire extinguishers.
 2. The Contractor shall inspect and check each extinguisher at least once a week during the Contract period and shall affix a dated tag certifying adequacy of charge and workability of each extinguisher.
 3. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
 4. Where exposed electrical and/or telephone equipment occurs, fire extinguishers of dry chemical type for Class B and C fires shall be provided.
- B. Fire Watch: When open flame or spark-producing tools and equipment such as blow torches welding rods, and heating kettles on roofs, are being used, the Contractor shall provide fire guards to maintain a fire watch over the operation of these items at all times during the use and until all materials have cooled sufficiently to no longer constitute a fire hazard. Provide additional fire guard required by Fire Department as determined by the Local Fire Department inspector after Work is under way.

3.6 STORAGE AND USE OF HAZARDOUS, FLAMMABLE OR PRESSURIZED MATERIALS

- A. Hazardous, flammable or pressurized materials shall not be stored in the building, including roof, and shall be removed from the premises at the completion of each day's work.

1. Hazardous, flammable or pressurized materials shall be storage on the site in fire rated containers provided by Contractor.
- B. The handling and storage of all welding materials, acetylene and oxygen tanks, burners and other equipment required for the execution of welding and cutting work shall be subject at all times to the approval of the Owner. All welding materials and gas tanks shall be promptly removed from the premises upon completion of each day's work. Welding and equipment shall conform to the American Welding Society's Code for Welding in Building Construction, latest edition (subject to State and local laws and ordinances).
- C. The Contractor shall provide and supervise the provision of compressed air required for any work.
- D. Vacuum attachments shall be used on saws and drills. Use HEPA filters with this equipment.
- E. Metal ladders shall not be used within 10-feet of working telephone equipment.
- F. Welding:
 1. Contractor shall obtain Owner's permit for welding and cutting as per attached sample at the end of this Section.
 2. The handling and storage of all welding materials, acetylene and oxygen tanks, burners and other equipment required for the execution of welding and cutting work, shall be subject at all times to the approval of the OWNER Representative. All welding materials and gas tanks shall be promptly removed from the premises upon completion of each day's work. Welding and equipment shall conform to the American Welding Society's Code for Welding in Building construction, latest edition (subject to State and local laws and ordinances).
 3. An exhaust system shall be provided for welding to occur inside the building. Heads shall be wrapped before welding can occur. The heads shall be unwrapped at the end of each workday.
- G. Compressed Air: The Contractor shall provide, or supervise the provision of, compressed air required for any work.
- H. The Contractor shall notify Owner Representative before using materials with an odor that could enter the main buildings through air intake vents. The Contractor shall, if directed, cover the intake vents and, if necessary, wait for the main building HVAC system to be shut down.
- I. Explosive or powder driven fasteners or pins will **not** be permitted inside the building under any circumstances.
- J. Equipment driven by internal combustion engines will **not** be permitted inside the building under any circumstances.

3.7 OPERATION, TERMINATION AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by extreme temperatures and similar elements.
- C. Termination and Removal: Remove each temporary facility when the need has ended, or no later than Substantial Completion. Restore permanent construction that has been damaged or disturbed by installation of the temporary facility. Repair damaged work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
 - 1. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
 - a. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 - b. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01500

**SECTION 01540
CONSTRUCTION HOISTING AND RIGGING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section specifies requirements for temporary services necessary and required to complete all hoisting and rigging for removal and installation of underground fuel oil tank.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Perform hoisting and rigging complying with requirements of authorities having jurisdiction and provisions of the following specifications and documents:
 - 1. Occupational Safety and Health Administration (OSHA): Rigging equipment regulations.
 - 2. Code of Federal Regulations" 29 CFR 1926.251, "Rigging Equipment for Material Handling" and 29CFR 1926.550, "Cranes and Derricks".
 - 3. Contractor shall strictly observed, be familiar with, and obtain above listed rules and regulations and maintain them at the job site.
- B. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- C. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services in rigging and structural engineering of the kind required. Engineering services are defined as those performed for projects with hoisting and rigging that are similar to that indicated for this Project in material, design, and extent.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings" and the following:
 - 1. At least 10 days prior to scheduled rigging and hoisting, conduct a meeting to review detailed "Rigging Procedure Plan" and to determine procedures for satisfactory rigging operations. Establish work progress schedule and procedures for inspection.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CONTRACTOR RESPONSIBILITIES

- A. Contractor shall engage a licensed Professional Engineer experienced in rigging and structural engineering, to develop "Rigging Procedure Plan".
 - 1. "Rigging Procedure Plan" shall include:
 - a. Rigging equipment data sheets, equipment catalogs and specifications for the rig to be used on the job.
 - b. Calculations to confirm the safe operation of the rigging equipment during the various stages, from lifting to placing the object in its final position.
 - c. Inspection the rig and other equipment and devices to be used in the rigging operation to verify that the equipment, etc. is in a safe condition.
 - d. Supervision the rigging operation to ensure that it follows the approved "Rigging Procedure Plan" and ensure safety during the rigging operation.

3.2 INSPECTION AND TESTING

- A. Rigging shall not take place unless the Owner is notified 48 hours in advance and the Professional Engineer responsible for the "Rigging Procedure Plan" has inspected and approved the rigging equipment and placement., and is present during the entire period of rigging.
- B. Hoisting and rigging equipment shall be inspected prior to use on each shift by the Professional Engineer responsible for the "Rigging Procedure Plan".
- C. Witness test loading of rigging equipment when required by OSHA requirements.
- D. All equipment, including chains, hooks, rings, wire rope, etc. shall meet the requirements of "Code of Federal Regulations" 29 CFR 1926.251, "Rigging Equipment for Material Handling" (Appendix C) and 29CFR 1926.550, "Cranes and Derricks".

END OF SECTION 01540

SECTION 01600 MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
 - 1. Installation of new material and equipment.
 - 2. Installation of existing removed material and equipment.
 - 3. Manufacturer's instructions.
 - 4. Transportation and handling.
 - 5. Storage and protection.
 - 6. Existing utilities or services.
 - 7. Integrity of fire, sound and weatherproof assemblies.

1.3 INSTALLATION OF NEW MATERIAL AND EQUIPMENT

- A. General: Contractor shall ensure that all materials furnished will be new, free from defects in design, material and workmanship and will conform to and perform in accordance with the specifications, drawings and samples.
- B. Inspection of Conditions: Require the Installer of each component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- C. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- D. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- E. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- F. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Architect/Engineer for final decision.

- G. Recheck measurements and dimensions, before starting each installation.
- H. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- I. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- J. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.
- K. Mechanical Installations: Comply with the following requirements:
 - 1. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 2. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
 - 3. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
- L. Warranties: Contractor shall provide cost to maintain normal guarantees and warranties of equipment reassembled at job site.

1.4 EXISTING REMOVED MATERIAL

- A. Do not install existing removed materials and equipment, unless otherwise indicated
- B. For existing removed material and equipment specifically indicated to be installed in the Work:
 - 1. Use special care in removing, handling, storing and reinstalling to assure proper function in the completed Work.
 - 2. Provide transportation, storage, and handling of materials and equipment which require off-site storage, restoration, or renovation.

1.5 MANUFACTURER'S INSTRUCTIONS

- A. When Contract Documents require installation to comply with manufacturer's recommendations, obtain copies of instructions and distribute to parties involved.
 - 1. Maintain 1 set of complete instructions at the Project Site during installation and until completion.
 - 2. Submit 2 copies to Architect/Engineer to comply with Section 01300.

- B. Handle, install, connect, clean, condition and adjust products in compliance with manufacturer's recommendations and to comply with specified requirements.
 - 1. Should Project conditions or specified requirements conflict with manufacturer's recommendations, consult with Architect/Engineer for clarification.
 - 2. Do not proceed with Work without written clear directions.
 - 3. Do not omit preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.6 TRANSPORTATION AND HANDLING

- A. Arrange product deliveries to comply with construction schedules. Coordinate to avoid conflict with Work and conditions at Project Site.
 - 1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and reviewed submittals and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products to prevent soiling or damage to products or packaging.
- C. Contractor and subcontractor is responsible for items damaged by their employees and shall remove such damaged items and provide new without additional cost to Contract.
- D. Arrange with material suppliers and manufacturers for delivery and entry of equipment into the building at a suitable time. Inform appropriate parties of the size of building entries available for equipment so assembly of large units of equipment on Project Site may be considered when they are being manufactured.

1.7 STORAGE AND PROTECTION

- A. Store products to comply with manufacturer's recommendations, with seals and labels intact and legible.
- B. Store products subject to damage by the elements in weathertight enclosures.
 - 1. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- C. Exterior Storage:
 - 1. Store fabricated products above ground, on blocking or skids, to prevent soiling or staining.
 - 2. Cover products which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

3. Store loose granular materials on solid flat surface in well drained area. Prevent mixing with foreign matter.
- D. Provide substantial coverings to protect installed products from damage caused by traffic and subsequent construction operations. Remove when no longer needed.
- E. Arrange storage to allow access for inspection and verification. Periodically inspect to ensure products are undamaged and secured.
- F. Contractor and subcontractor are responsible for damaged, broken, or scratched glass and fixtures shall replace such damaged items without additional cost to Contract.

1.8 EXISTING UTILITIES OR SERVICES

- A. Comply with applicable sections of Public Service Law Article 36 of the General Business Law and Industrial Code Rule 53.
- B. Provide protection to prevent damage or interference to existing utility or service lines and mains.
- C. If there is damage to a known existing utility or service line or main, the party responsible shall repair or have the damage repaired as directed by the utility or service company, without additional cost to the Contract.
- D. If an unknown utility or service line or main is uncovered, stop Work in that area and notify the utility or service company, Contractor, and Owner to obtain information on how to proceed.

1.9 INTEGRITY OF FIRE, SOUND AND WEATHERPROOF ASSEMBLIES

- A. Spaces formed between fire or sound rated wall, floor, ceiling, or roof assemblies or penetrations through such assemblies by pipe, conduit, ductwork, any other item, or voids provided for possible use of any item shall be caulked, grouted, filled or otherwise protected in a manner to maintain fire or sound ratings.
 1. Pack openings to comply with systems specified under Section 07840.
 - a. Do not use solid shims.
- B. Where openings or penetrations are subject to moisture or weather, seal openings and penetrations with non-shrink grouts and elastomeric sealants intended for specific application.
 1. Seal floor penetrations during construction to prevent water from flowing through building.
 2. Where safing and batt insulation are used, protect from moisture. Remove damp material and install new material before enclosing.

- C. Sound Control: Maintain sound ratings through partitions which have a designed STC rating. General construction practices include requirements specified herein.
 - 1. Oversize pipe openings to allow approximately 1/2 inch air space around pipes. Pack openings to comply with systems specified under Section 07900.
 - a. Do not use solid shims.
 - 2. Pull, junction and outlet boxes in corridors or area separation (party) walls: Separate boxes opening on opposite sides of wall by not less than 8 inches in concrete walls, 16 inches in masonry walls or not less than 1 stud space in frame construction walls.
 - 3. Openings in pull, junction or outlet boxes in corridor, area separation (party) or exterior walls, and area separation (party) ceilings: Seal shut to comply with Section 07900.
 - 4. Provide flexible metal conduit at electrical connections made to vibrating or motor operated equipment.
 - 5. Use rubber inserts where conduit is fastened to metal members.
 - 6. Backside of pull, junction or outlet boxes in corridor, area separation (party) or exterior walls, and area separation (party) ceilings: Fill with polyfoam.
 - 7. Openings between pull, junction or outlet boxes, and the gypsum board in area separation (party), corridor and exterior walls: Seal with acoustical sealant material.

1.10 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01600

**SECTION 01630
PRODUCT OPTIONS AND SUBSTITUTIONS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections: The following sections contain requirements that relate to this section.
 - 1. Division 1 Section 01631 - Substitution Request Form.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling requests for products substitutions made to the Contract.
 - 1. Special definitions.
 - 2. Methods of specifying.
 - 3. Substitution time frame and considerations.
 - 4. Supporting information for substitutions.
 - 5. Consideration requirements.
 - 6. Substitution request process.
 - 7. Contractor's/Bidder's representation.
 - 8. Architect/Engineer evaluation process.

1.3 DEFINITIONS

- A. Standard of Quality: Specified manufacturers, materials, products, and equipment have been used in preparing the Contract Documents and thus establish minimum qualities for performance and appropriateness.
 - 1. Materials, products, and equipment described in the Contract Documents establish a standard of required operation, dimension, appearance, and quality.
 - 2. Comply with specifications and reference standards as minimum requirements.
 - 3. Where a particular manufacturer and product is indicated, followed by a description of the product (material and equipment) including special features or performance criteria, the manufacturer shall agree to make necessary modifications to their "Standard or Custom Products" to fully comply with the product described.
- B. Base Bid: Base on materials, products, and equipment described in the Contract Documents.

1. The phrase "or equal" is not used within this Project Manual and is not implied. Requests for substitutions shall be made to comply with the procedures specified herein.
 2. It is understood and agreed by bidders, contractors, material suppliers, and tier subcontractors that bids and contracts shall be based on products (material and equipment) and processes as specified or as revised by addenda or modification.
- C. Substitutions: Requests for changes in products (materials and equipment) and methods of construction required by the Contract Documents are requests for "substitutions".
1. The following are not defined as substitutions as used herein:
 - a. Revisions to Contract Documents requested by the Owner or Architect/Engineer.
 - b. Specified product options or alternate construction methods included in Contract Documents.
 - c. Contractor's determination of and compliance with governing regulations and orders issued by authorities having jurisdiction.

1.4 METHODS OF SPECIFYING

- A. Reference Standard Specifications: Where products (material and equipment) are specified only by reference standard, provide products complying with standard.
- B. Descriptive Specifications: Where products (material and equipment) are specified by indicating a detailed description of the required properties, minimum attributes, special features, or performance criteria required, provide products complying with the specified description.
1. If a descriptive specification is followed by a list of specified manufacturers or specified products, select a product from only those listed.
 - a. If a manufacturer's standard product is listed in the specification and does not comply with the minimum description indicated, make modifications to the "Standard or Custom Product" to make the product fully comply with the description of the specified product's special features, or performance criteria.
 2. If a list of specified manufacturers includes the following statement "provide product by one of the following", then select product from only manufacturers listed in the Project Manual or addenda complying with the minimum attributes, special features, or performance criteria.
- C. Proprietary Specifications: Where the desired products (material and equipment) are indicated by a specific manufacturer's name, brand name, model number, type

designation, or other unique characteristics, provide only products listed in the original Project Manual or addenda.

1. Where indicated in the Project Manual as "No Substitution", bids must be based on the specific named product only.
- D. The design layout, space allocations, connection details, performance criteria, etc., are based on specifically identified proprietary products identified in PART 2 - PRODUCTS of each specification section.
1. Other manufacturers, even if listed as "Manufacturers", shall comply with the minimum levels of material, detailing, and dimensional restrictions established by the proprietary product.

1.5 SUBSTITUTION TIME FRAME AND CONSIDERATIONS

A. Pre-Bid Substitutions (Prior Approval):

1. Submittal Time Limit: As indicated in "Request for Quotation".
2. Consideration: Substitution will only be considered if submitted by a Invited Contractor and each request includes the information listed under "Consideration Requirements" Article specified below.
3. Consideration: Substitution will only be considered if each request includes the information listed under "Consideration Requirements" Article specified below.
4. Failure to complete "Substitution Request Form" or submit requested information is grounds for rejection.

B. Post-Bid/Pre-Award Substitutions: Bid Adjustment Substitutions:

1. Substitution Time Limit: Before Award of Contract date and within seven (7) days after Bid Opening date.
2. Consideration: Substitution will only be considered if submitted by the pending Contractor and substitution request is being made because a specified product has become unavailable.
 - a. Request shall include information listed under "Consideration Requirements" Article specified below.

C. Substitution Requests Made After Award of Contract:

1. Substitution Time Limit: Submittal for substitution will be consider if received within _(15) days after commencement of the Work. Requests received more than fifteen (15)_days after commencement of the Work may be considered or rejected at the discretion of the Architect/Engineer.
2. Consideration: Substitution will only be considered if submitted by the Contractor and substitution request is being made because a specified product has become unavailable.

- a. Request shall include information listed under "Consideration Requirements" Article specified below.
- b. Request will not be considered if product or method cannot be provided as a result of Contractor's failure to pursue the Work promptly or coordinate activities properly.

1.6 SUPPORTING INFORMATION FOR SUBSTITUTIONS

- A. Include the following supporting information: Name of product (material or equipment) for which substitution is being requested and a complete description of the proposed substitute including drawings, product data, performance and test data, and any other information necessary for an evaluation.
 1. Substitution Request: Section 01631 - Completed Request Substitution Form must accompany each request for substitution.
 - a. Include a statement indicating changes in other materials, equipment, or other Work that incorporation of this substitute would require.
 - b. Alterations or changes to other Work are the responsibility of the Contractor proposing substitution, including redesign if determined by Architect/Engineer.
 2. Burden of proof of the merit of the proposed substitute is upon the proposer.
- B. It is understood and agreed by bidders, Contractors, material suppliers, and tier subcontractors, that bids and contracts shall be based on products (material and equipment) and processes as specified or as revised by addenda or modification.

1.7 CONSIDERATION REQUIREMENTS

- A. Substitution request will be considered by Architect/Engineer when the following conditions are satisfied:
 1. Extensive revisions to Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of Contract Documents.
 3. Request is timely, fully documented, and properly submitted.
 - a. Substitution Request Form is completed and attached.
 4. Additionally, 1 or more of the following are satisfied:
 - a. If a specified product is not available.
 - b. Specified product or method of construction cannot receive necessary approval by a governing authority, and request substitution can be approved.
 - c. Substantial advantage is offered to Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear as determined by Architect/Engineer, which includes additional

- compensation to Architect/Engineer for redesign and evaluation services, increased cost of other construction, or separate contractors and similar considerations.
- d. Specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where Contractor certifies substitution will overcome incompatibility.
 - e. Specified product or method of construction cannot be coordinated with other materials, and Contractor certifies proposed substitution can be coordinated.
 - f. Specified product or method of construction cannot provide a warranty required by the Contract Documents and Contractor certifies proposed substitution provides required warranty.
- B. Where proposed substitution involves more than one installer, installers shall cooperate to coordinate the Work, provide uniformity and consistency, and to assure compatibility of products.
- C. Submit a separate substitution request for each product, supported with complete product data, drawings, and samples including but not limited to the following:
- 1. Comparison of qualities of proposed substitution with specified product.
 - 2. Changes required in other elements of the Work because of the substitution.
 - 3. Effect on construction schedule.
 - 4. Cost data comparing proposed substitution with specified product.
 - 5. License, fees, or royalties required.
 - 6. Availability of maintenance service and source of replacement materials.
- D. To determine if proposed substitution complies with the function, appearance, quality, performance, and dimensional characteristics of specified item, Architect/Engineer may:
- 1. Require sample units, technical product data, and independent test reports sufficient to establish compliance.
 - a. Cost of which shall be paid by the submitting party.
- E. Substitution request not complying will be returned without action other than to record noncompliance with submittal requirements.

1.8 SUBSTITUTION REQUEST PROCESS

- A. Where manufacturer's shop drawings, pamphlets, or finish samples are required to be submitted by the Specification or Drawings, final approval of proposed substitutions or deviations will be contingent upon the furnishing of acceptable shop drawings, pamphlets, or finish samples.

1.9 CONTRACTOR'S/BIDDER'S REPRESENTATION

- A. A request for substitution constitutes a representation that Contractor/Bidder:

1. Has investigated proposed product and determined that it is equal to or superior in all respects to specified product.
2. Will provide the same or better warranties or bonds for substitution as for the specified product.
3. Will coordinate installation of substitution, if accepted, into the Work; and make other changes as required to make the Work complete.
4. Waives claims for additional costs, under his responsibility, which may subsequently become apparent.
5. Will pay the Owner for Architect's/Engineer's time required by substitutions to modify and coordinate documents as a result of change.

1.10 ARCHITECT/ENGINEER EVALUATION PROCESS

- A. Architect/Engineer is sole judge of acceptability of proposed substitution.
- B. Architect/Engineer will review requests for substitutions with reasonable promptness, and respond as follows:
 1. Request additional information or documentation necessary for evaluation.
 2. Pre Award: Notify Bidders of the decision to accept proposed substitution by written addendum.
 3. Post Award: Notify Contractor in writing of the decision to accept or reject proposed substitution.
 - a. Accepted substitutions will be documented by Addendum, Modification (Change Order), including manufacturer's names and catalog numbers.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01630

**SECTION 01631
SUBSTITUTION REQUEST FORM**

To: Dimovski Architecture PLLC
59 Kensico Road, Thornwood, NY 10594
Attention: Paulette Dimovski

DA Ref. No.: 2034 _____

Date Received: _____

Project: Liberty Plaza Suites
500 Commerce Street LLC
500 Commerce Street, Hawthorne, NY 10532

Specification Section Number and Paragraph:

Drawing and details affected:

Proposed Substitution:

Manufacturer: _____ Product (model, pattern, etc.):

WHY IS SUBSTITUTION BEING SUBMITTED? (Select 1 of the following and attach explanations.)

(_____) Specified Product is not available. (Explain)

(_____) Cost Saving to Owner. Indicate comparative cost analysis.

(_____) Other. (Explain).

EFFECTS OF PROPOSED SUBSTITUTION Answer the following questions and attach explanations.

Does substitution affect dimensions indicated on Drawings? () NO
() YES, (explain)

Does substitution affect Work of other Sections? () NO
() YES, (explain)

Does substitution require modifications to design, changes to Drawings, or revisions to specifications to be incorporated into the Project? () NO
() YES, (explain)

**SECTION 01631
SUBSTITUTION REQUEST FORM**

Attach list of at least 3 projects where proposed substitution has been used within past 12 months, include name, address, and telephone number of Owner and Architect/Engineer.

CONTRACTOR'S / BIDDERS REPRESENTATION

Undersigned accepts responsibility for coordination of proposed substitution into the Project per Section 01630.

SUBMITTED BY:

(____)

Too Late (____)

For Architect/Engineer use:

Accepted (____) Not Accepted

No Action Required (____)
Submission: Incomplete (____)

Reviewed by/date:

Comments

Subcontractor's signature and date:

Contractor's signature and date:

SECTION 01700 PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings including General Conditions and Division 1 Specification Sections.

1.2 SUMMARY

- A. Section specifies administrative and procedural requirements for project close-out, including but not limited to:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Operating and maintenance manual submittal.
 - 4. Operating and maintenance instruction.
 - 5. Submittal of warranties.
 - 6. Final cleaning.
- B. Close-out requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - a. If 100 percent completion cannot be shown, include a list of items to be completed and corrected (punch list), the value of incomplete construction, and reasons the Work is not complete.
 - 2. Advise Owner of pending insurance change-over requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 - 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

5. Submit record documents, maintenance manuals, records of operating and maintenance instruction, damage or settlement survey, property survey and similar final record information.
 6. Deliver tools, spare parts, extra stock and similar items.
 7. Make final change-over of permanent locks and transmit keys to the Owner.
 8. Advise the Owner's personnel of change-over in security provisions.
 9. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel.
 10. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
 11. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the Architect/Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Architect/Engineer will repeat inspection when requested and assured that the Work has been substantially completed.
 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 3. Submit a certified copy of the Architect's/Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect/Engineer.
 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
 5. Submit the following AIA Documents fully filled out and executed:
 - a. Contractor's Affidavit of Payment of Debts and Claims - AIA Document G706.
 - b. Contractor's Affidavit of Release of Liens - AIA Document G706A.
 - c. Consent of Surety - AIA Document G707.

6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 7. Inventory extra materials and other stored items jointly with Owner and Architect/Engineer to verify all items designated for storage are on the premises or accounted for.
- B. Reinspection Procedure: The Architect/Engineer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect/Engineer.
1. Reinspection Fee: Should status of completion of Work require reinspection due to failure of Work to comply with Contractor's claims on initial inspection, Owner will deduct amount of Architect's compensation for reinspection services from final payment to Contractor.
 2. Upon completion of reinspection, the Architect/Engineer will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 3. If necessary, reinspection will be repeated.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit 3 copies 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 from lowest floor to highest floor.
 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.

1.6 PROJECT RECORD DOCUMENT

- A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's/Engineer's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as

originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
 2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
 3. Note related Change Order numbers where applicable.
 4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.
- D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.
- E. Record Sample Submittal: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect/Engineer and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.
- F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Architect/Engineer for the Owner's records.

1.7 WARRANTIES

- A. Submittal Time: 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.

- B. Submit three (3) fully executed copies of each warranty required by specification.
- C. Partial Occupancy: Submit properly executed warranties within 30 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.
- D. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½ 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.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Operation and Maintenance Manuals: Submit four (4) copies of operation and maintenance manuals. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy duty 2-inch, 3-ring vinyl covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder.
 - 1. Describe function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replaceable parts.
 - 2. Furnish manufacturer's printed operating procedures and instructions for start-up, break-in, routine and normal operation; regulation, control, stopping, shut-down, and emergency instructions, and summer and winter operation.
 - 3. Include maintenance procedures for routine preventive maintenance and trouble shooting; disassembly, repair, and reassembly; aligning and adjusting instructions; servicing instructions and lubrication charts and schedules.
 - 4. Include the following types of information:
 - a. Emergency instructions.
 - b. Spare parts list.
 - c. Copies of warranties.
 - d. Wiring diagrams.
 - e. Recommended "turn around" cycles.
 - f. Inspection procedures.
 - g. Shop Drawings and Product Data.
 - h. Fixture lamping schedule.

- i. Final Testing, Adjusting and Balancing Reports.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Arrange for each Installer of equipment requiring regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives, including detailed review of the following items:
 1. Maintenance manuals.
 2. Record documents.
 3. Spare parts and materials.
 4. Tools.
 5. Lubricants.
 6. Fuels.
 7. Identification systems.
 8. Control sequences.
 9. Hazards.
 10. Cleaning.
 11. Warranties and bonds.
 12. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following procedures:
 1. Startup.
 2. Shutdown.
 3. Emergency operations.
 4. Noise and vibration adjustment.
 5. Safety procedures.
 6. Economy and efficiency adjustments.
 7. Effective energy utilization.
- C. Provide operating and maintenance instruction to Owner's personnel for systems and equipment specified in individual specification sections.
- D. Instruction Periods: Provide minimum instruction periods, comprised of approximately 50 percent classroom instruction and 50 percent "hands-on" instruction. Coordinate regulations instruction with Specification Section in Divisions 14, 15 and 16.
- E. Prepare written agenda for each session and submit for review and possible modification. Include date, location, purpose, specific scope, proposed attendance, and duration.

- F. Record, in DVD format, hands-on training sessions and classroom instruction. No special effects are required.

3.2 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions and included in Section 01500 - Temporary Facilities.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- C. Complete the following cleaning operations no earlier than one week before requesting inspection for Certification of Substantial Completion:
 - 1. Remove labels that are not permanent labels.
 - 2. Clean transparent materials, including glass in doors. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - 3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition.
 - 4. Leave concrete floors broom clean.
 - 5. Vacuum carpeted surfaces.
 - 6. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - 7. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
 - 1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01700

**SECTION 04100
MORTAR & MASONRY GROUT**

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section shall be governed by the contract documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this Section as shown on the Drawings, as specified herein, and/or as required by job conditions.
- B. The work shall include but not be limited to the following:
 - 1. Mortar
 - 2. Grout

1.2 RELATED WORK SPECIFIED ELSEWHERE – Refer to Specifications on Drawings for all related Structural and Site Work.

1.3 QUALITY ASSURANCE

- A. Materials and methods of construction shall comply with the following standards and association recommendations:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. NYSDOT

1.4 SUBMITTALS

- A. Product Data: For Mortar and Grout Materials.
- B. Grout Samples for Initial Selection: Manufacturer's standard samples of actual products showing the full range of colors available.
- C. Grout Samples for Verification: For each color required, showing full range of exposed color and texture expected in completed Work.
- D. Color Mortar Samples for Verification: For each color required.
- E. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed stone walls and stone paving and setting in material, design and extent to that indicated for Project that has resulted in construction with a record of successful in-service performance.
- B. Fabricator Qualifications: Engage a firm experienced in producing stone walls and stone paving and setting similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.
- C. Source Limitations for Mortar and Grout Materials: Obtain each type of cementitious material, grout, admixture, sealant and other material from a single manufacturer for each product.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site in undamaged condition.
- B. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, or other causes.
 - 1. Store cementitious materials off ground, under cover and in dry location.
 - 2. Store aggregate materials covered in dry location.

PART 2 PRODUCTS

2.1 MORTAR & GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Masonry Cement: ASTM C 91.
 - 1. For pigmented mortars, use premixed, colored masonry cements of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 5 percent of masonry cement by weight for mineral oxides nor 1 percent for carbon black. Submit samples for approval.
- C. Hydrated Lime: ASTM C 207, Type S
- D. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

1. For pigmented mortars, use colored permanent Portland cement-lime mix of foundation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 10 percent of Portland cement by weight for mineral oxides nor 2 percent for carbon black.
- E. Aggregate for Mortar: ASTM C 144; except for joints less than ¼ inch (6.5mm), use aggregate graded with 100 percent passing the No. 16 (1.18mm) sieve.
- F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- G. Water-Repellant Admixture: Liquid water-repellant mortar admixture intended for use with CMU, containing integral water repellent by same manufacturer.
- H. Water: Clean, fresh and potable.
- I. Cementitious Grout: Nonshrink as per ASTM C827 and CRD-C-621, and must contain no expansive cements or metallic powders such as aluminum or iron filings.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide one of the following:
 1. Colored Masonry Cement:
 - a. Brixment-in-Color; Essroc Materials, Inc.
 - b. Centurion Colorbond; Lafarge Corporation.
 - c. Lehigh Custom Color Masonry Cement; Lehigh Portland Cement Co.
 - d. Flamingo Color Masonry Cement; Riverton Corporation (The).
 - e. or approved equivalent
 2. Mortar Pigments:
 - a. True Tone Mortar Colors; Davis Colors.
 - b. Centurion Pigments; Lafarge Corporation.
 - c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.
 - d. or approved equivalent
 3. Water-Repellant Admixture:
 - a. Dry-Block Mortar Admixture; Grace: W.R. Grace & Co
 - b. or approved equivalent

2.3 MORTAR MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.

1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride.
 2. Mixing: Combine and thoroughly mix cementitious materials, water and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortar when it has reached initial set.
- B. Mortar for Stone: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
1. Set stone with Type S mortar.
- C. Cement-Paste Bond Coat: Mix bond coat to a consistency similar to that of thick cream and consisting of either neat cement and water or cement, sand and water.
- D. Setting Mortar and Pointing Mortar: Mix consisting of 1 part Portland cement, 1 part lime, 7 parts loose damp sand and enough water to produce a workable consistency.
- E. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.
1. Mix to match approved sample.
 2. Limit pigments to the following percentages of cement content by weight:
 - a. For mineral-oxide pigments and masonry cement mortar, not more than 5 percent.
 - b. For carbon-black pigment and masonry cement mortar, not more than one percent.

2.4 GROUT MIXES

- A. Grout: Comply with ASTM C 476. Use grout of consistency indicated at time of placement that will completely fill spaces intended to receive grout.
1. Grout: One part nonstaining Portland cement, 1½ part white damp loose sand.
- B. "Five Star Grout" as manufactured by U.S. Grout Corporation, Fairfield, CT (800) 243-2206 or approved equal.

2.5 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.

- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.
- F. Use mortar within two hours after mixing at temperatures of 90 degrees, or two-and-one-half hours at temperatures under 40 degrees F.

2.6 GROUT MIXING

- A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with manufacturer's instructions.
- B. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- C. Do not use anti-freeze compounds to lower the freezing point of grout.

2.7 MIX TESTS

- A. Test mortar and grout in accordance with Section 01400.
- B. Testing of Mortar Mix: In accordance with ASTM C270.
- C. Testing of Grout Mix: Min. 28-day compressive strength of 5,000 psi when tested in accordance to ASTM C109, restrained. Grout shall show no shrinkage (0,0%) and a maximum 0.2% expansion in the hardened state when tested according to CRD C-621.

PART 3 EXECUTION

- A. Mortar joints shall be colored Portland cement to match color of stone and pavers unless otherwise directed by the Owner's Representative. Submit samples for approval prior to installation.
- B. Place mortar to the thickness' as shown on the Contract Drawings.
- C. Set stone as shown on the Contract Drawings.
- D. Joints shall be pointed full and flush.

END OF SECTION 04100

**SECTION 04810
UNIT MASONRY ASSEMBLIES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
1. Concrete masonry units.
 2. Decorative concrete masonry units.
 3. Prefaced concrete masonry units.
 4. Face Brick.
 5. Mortar and grout.
 6. Reinforcing steel.
 7. Masonry joint reinforcement.
 8. Ties and anchors.
 9. Embedded flashing.
 10. Cavity wall insulation
 11. Miscellaneous masonry accessories.
- B. Related Sections include the following:
1. Division 7 Section "Bituminous Dampproofing" for dampproofing applied to cavity face of backup wythes of cavity walls.
 2. Division 7 Section "Firestopping" for firestopping at tops of masonry walls and at openings in masonry walls.
 3. Division 8 Section "Metal Doors and Frames" for metal door frames installed in masonry.
 4. Division 9 Section "Graffiti Resistant Coatings" for graffiti resistant coating applied to exterior face of exterior masonry units and face of interior masonry units.
 5. Refer to structural drawings for location and reinforcement of masonry lintels.
- C. Products furnished, but not installed, under this Section include the following:
1. Dovetail slots for masonry anchors, installed under Division 3 Section "Cast-in-Place Concrete."

- D. Products installed, but not furnished, under this Section include the following:
1. Cast-stone, furnished under Division 4 Section "Cast Stone."
 2. Steel lintels and shelf angles for unit masonry, furnished under Division 5 Section "Metal Fabrications."
 3. Manufactured reglets in masonry joints for metal flashing, furnished under Division 7 Section "Sheet Metal Flashing and Trim."

1.3 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Samples for Initial Selection: For the following:
1. Unit masonry Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
 2. Colored mortar Samples showing the full range of colors available.
- C. Samples for Verification: For the following:
1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project.
 3. Weep holes/vents in color to match mortar color.
 4. Accessories embedded in the masonry.
- D. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
1. Each type of masonry unit required.
 2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 4. Each material and grade indicated for reinforcing bars.
 5. Each type and size of joint reinforcement.

6. Each type and size of anchor, tie, and metal accessory.
- E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.5 QUALITY ASSURANCE

- A. 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, through one source from a single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- C. CMU producer shall be qualified by manufacturer of integral water-repellent.
- D. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- E. Sample Panels: Before installing unit masonry, build sample panels, using materials indicated for the completed Work, to verify selections made under sample Submittals and to demonstrate aesthetic effects. Build sample panels for each type of exposed unit masonry assembly in sizes approximately 48 inches long by 48 inches high by full thickness.
 1. Locate panels in the locations indicated or, if not indicated, as directed by Architect.
 2. Clean exposed faces of panels with masonry cleaner indicated.
 3. Protect approved sample panels from the elements with weather-resistant membrane.
 4. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
 5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels, unless such deviations are specifically approved by Architect in writing.
 6. Demolish and remove sample panels when directed.

- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

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.
 - 1. Protect Type I concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.
- 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 preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 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 rain-splashed mud and from mortar splatter by coverings spread 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.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

- E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
 - 1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows:
 - 1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 - 2. Provide bullnose units for outside corners, unless otherwise indicated.
 - 3. Provide square-edged units for outside corners, unless indicated as bullnose.

- B. Concrete Masonry Units: ASTM C 90, Grade N-1 and as follows:
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.
 - 2. Weight Classification: Normal weight.
 - 3. Provide Type I, moisture-controlled units.
 - 4. Size: 7-5/8" high, 15-5/8" long x widths indicated
 - 5. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

- C. Decorative Concrete Masonry Units: ASTM C 90, type I and as follows:
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 - 2. Weight Classification: Normal weight , unless otherwise indicated.
 - 3. Provide Type I, moisture-controlled units.
 - 4. Size: Manufactured to dimensions indicated for nondecorative units.

5. Finish: Exposed faces of the following general description matching color, pattern, and texture of Architect's samples.
 - a. Normal-weight aggregate, ground-face finish.
 - 1) Manufacturer: Westbrook Concrete Block. Solid color blend, color to be selected by the Architect.
 - b. Normal-weight aggregate, split-face finish.
 - 1) Manufacturer: Westbrook Concrete Block, Burnt blend.
6. Performance Requirements:
 - a. Water permeance of Masonry: ASTM E514, extended to 72 hours.
 - b. Bond Strength of Concrete Masonry: ASTM C 1317.
 - c. Concrete Masonry Prism strength: ASTM C 1314.
7. Integral Water Repellent: Provide units made with liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of the test specimen.
 - a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Block Plus W-10; Addiment Inc.
 - 2) Dry-Block; W. R. Grace & Co., Construction Products Division.
- 3) Rheopel; Master Builders

2.2 BRICK

- A. General: Provide shapes indicated and as follows for each form of brick required:
 1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.
- B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.

1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Face Brick: ASTM C 216 Grade SW, Type FBX, and as follows:
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
 2. Initial Rate of Absorption: Less than 20 g/30 sq. in. per minute when tested per ASTM C 67.
 3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 4. Size: Manufactured to the following actual dimensions:
 - a. Modular: 3-1/2 to 3-5/8 inches wide by 2-1/4 inches high by 7-1/2 to 7-5/8 inches long.
 5. Application: Use where brick is exposed, unless otherwise indicated. Refer to drawings for location of each type of brick.
 6. Face brick selections:
 - a. Field brick: Carolina Ceramics, Iron Spot smooth brick.
 - b. Accent (soldier and rowlock courses) brick: Watsontown Brick Company, Manhattan Series, Carleton type 8 modular.

2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
- D. Mortar Cement: ASTM C 1329.
 1. For pigmented mortar, use a colored cement formulation as required to produce the color indicated or, if not indicated, as selected from manufacturer's standard formulations.
 - a. Pigments shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.

2. Prepare mortar for exposed exterior masonry from a colored masonry cement composed of natural or manufactured pigments of proven quality accurately weighted and batched, mill mixed with masonry cement and packaged under controlled plant conditions to achieve the desired color.
 - a. Acceptable manufacturers:
 - 1) The Riverton Corporation, Flamingo, colors as selected to match existing mortar color.
 - 2) An approved equal.
- E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 1. White-Mortar Aggregates: Natural white sand or ground white stone.
 2. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
- F. Aggregate for Grout: ASTM C 404.
- G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.
- I. Water: Potable.
- J. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- K. Products: Subject to compliance with requirements, provide one of the following:
 1. Mortar Cement:
 - a. Magnolia Superbond Mortar Cement; Blue Circle Cement.
 - b. Lafarge Mortar Cement; Lafarge Corporation.
 2. Cold-Weather Admixture:
 - a. Accelguard 80; Euclid Chemical Co.
 - b. Morseled; W. R. Grace & Co., Construction Products Division.
 - c. Trimix-NCA; Sonneborn, Div. of ChemRex, Inc.

2.4 REINFORCING STEEL

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60.

2.5 MASONRY JOINT REINFORCEMENT

- A. General: ASTM A 951 and as follows:
 - 1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
 - 2. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.
- B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c.

2.6 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
- B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.

2.7 ANCHORS FOR CONNECTING TO CONCRETE

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section: Dovetail anchor section formed from 0.0966-inch- thick, steel sheet, galvanized after fabrication.
 - 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch- diameter, hot-dip galvanized steel wire

2.8 ADJUSTABLE MASONRY-VENEER ANCHORS

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over existing masonry construction.
 - 1. Holman & Barnard, Inc, #345, galvanized.

2.9 BENT WIRE TIES

- A. General: Rectangular units with closed ends and not less than 4 inches wide.
 - 1. Where coursing between wythes does not align, use adjustable ties composed of 2 parts; 1 with pintles, the other with eyes; with maximum misalignment of 1-1/4 inches.
 - 2. Where wythes are of different materials, use adjustable ties composed of 2 parts; 1 with pintles, the other with eyes; with maximum misalignment of 1-1/4 inches.
 - 3. Wire: Fabricate from 1/4-inch- diameter, hot-dip galvanized steel wire.

2.10 CAVITY-WALL INSULATION

- A. Extruded-Polystyrene Board Insulation: Rigid, cellular, polystyrene thermal insulation with closed cells and integral high-density skin; formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578, Type X. Thickness as indicated on the drawings.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
- C. Cavity Drainage Material: 1-inch- thick, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings.
- D. Available Products: Subject to compliance with requirements, cavity drainage materials that may be incorporated into the Work include, but are not limited to, the following:
- E. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Plastic Weep Hole/Vent:
 - a. Cell Vent; Dur-O-Wal, Inc.
 - 2. Cavity Drainage Material:
 - a. Mortar Break; Advanced Building Products, Inc.
 - b. CavClear Masonry Mat; CavClear.
 - c. Mortar Net; Mortar Net USA, Ltd.

- d. Mortar Stop; Polytite Manufacturing Corp.

2.12 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:
1. Lead-Coated Copper Sheet: ASTM B 101, Temper H00 and H01, cold-rolled copper sheet, of weight indicated below, coated both sides with lead weighing not less than 12 lb/100 sq. ft. nor more than 15 lb/100 sq. ft. of copper sheet (total weight of lead applied equally to both sides).
 2. Fabricate through-wall metal flashing embedded in masonry from sheet metal indicated above and with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
- B. Solder for Lead-Coated Copper: ASTM B 32, Grade Sn60, 60 percent tin and 40 percent lead.

2.13 MASONRY CLEANERS

- A. 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.

2.14 SEALER FOR DECORATIVE CMU

- A. Clear sealer for decorative CMU shall be Treadcoat T1 as manufactured by Trenwyth Industries, Inc.,

2.15 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. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.
 3. Mortar used in exterior walls shall contain compatible water-repellent admixture.

- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the 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, Property Specification.
 - 1. Limit cementitious materials in mortar for exterior masonry to portland cement, mortar cement, and lime.
 - 2. For masonry below grade, in contact with earth, and where indicated, use Type S.
 - 3. For reinforced masonry and where indicated, use Type S.
 - 4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
 - 5. For interior non-load-bearing partitions, Type O may be used instead of Type N.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units

is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

3.3 CONSTRUCTION TOLERANCES

- F. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- G. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- H. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.
- I. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- J. 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.
- K. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

- L. 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.
- M. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
 - 1. One-half running bond with vertical joint in each course centered on units in courses above and below.
- N. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

- O. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- P. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- Q. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- R. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- S. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- T. 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, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- U. Lay hollow masonry units as follows:
 - 1. With full mortar coverage on horizontal and vertical face shells.
 - 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
 - 3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
 - 4. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the masonry.
- V. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
- W. Set cast stone units in full bed of mortar with vertical joints slushed full. Fill dowel, anchor, and similar holes solid. Wet stone-joint surface thoroughly be-

fore setting; for soiled stone surfaces, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.

3.6 BONDING OF MULTI-WYTHE MASONRY

- X. Use bonding system indicated on Drawings.
- Y. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.
 - 1. Provide continuity with masonry joint reinforcement at corners by using prefabricated "L" units as well as masonry bonding.
- Z. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
- AA. Provide continuity with masonry joint reinforcement by using prefabricated "T" units.

3.7 CAVITIES

- BB. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.
 - 1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
- CC. Coat cavity face of backup wythe to comply with Division 7 Section "Bituminous Dampproofing."
- DD. Installing Cavity-Wall Insulation: Attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
- EE. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.8 MASONRY JOINT REINFORCEMENT

- FF. General: Provide continuous masonry joint reinforcement as indicated. 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.
- GG. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- HH. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 ANCHORING MASONRY VENEERS

- II. Anchor masonry veneers to concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
1. Fasten anchors to concrete and masonry backup with metal fasteners of type indicated.
 2. Embed connector sections and continuous wire in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of masonry backup.
 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around the perimeter.

3.10 CONTROL AND EXPANSION JOINTS

- JJ. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- KK. Form control joints in concrete masonry as follows:
1. Form open joint of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants." Keep joint free and clear of mortar.
- LL. Build in horizontal, pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants."

3.11 CAST STONE UNITS

- MM. Drench units with clear water just before setting.
- NN. Set units in full bed of mortar with full head joints, unless otherwise indicated. Build anchors and ties into mortar joints as units are set.
 - 1. Fill dowel holes and anchor slots with mortar.
 - 2. Fill collar joint solid as units are set.
 - 3. Build concealed flashing into mortar joints as units are set.
- OO. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- PP. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- QQ. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- RR. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - 1. Sealing joints is specified in Division 7 Section "Joint Sealants."
 - 2. Keep joints free of mortar and other rigid materials.

3.12 LINTELS

- SS. Install steel lintels where indicated.
- TT. Provide masonry lintels where shown on the structural drawings.
 - 1. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
- UU. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.13 WEEP HOLES

- VV. General: Install weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- WW. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

1. Use round plastic tubing or open head joints to form weep holes.
2. Space weep holes formed from plastic tubing 32 inches o.c.
3. Place cavity drainage material immediately above weep holes in cavities.

XX. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.14 REPAIRING, POINTING, AND CLEANING

YY. 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.

ZZ. 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 a neat, uniform appearance. Prepare joints for sealant application.

AAA. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

BBB. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove "primary" efflorescence from masonry walls exposed in the finished work in accordance with the recommendations of NCMA TEK 8-3.
2. Excess wet mortar containing water-repellent additive shall be removed from the face of the masonry units promptly.
3. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
4. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
5. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
6. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

END OF SECTION 04810

SECTION 05721 STEEL RAILINGS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section shall be governed by the contract documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this Section as shown on the Drawings, as specified herein, and/or as required by job conditions.
- B. The work shall include but not be limited to the following:
 - 1. Steel ornamental railings

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete
- B. Metal Work
- C. Mortar and Masonry Grout

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding structural loads required by ASCE 7 without exceeding allowable design working stress of materials for handrails, railings, anchors, and connections.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. For installed railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Paint Substitution: A written request for paint substitution must be submitted to the Architect. The Contractor shall submit this request, along with manufacturer's data sheets for approval, a minimum of two (2) weeks prior to the intended date of paint application. All paint substitutes must be approved in writing prior to use.

1.4 QUALITY ASSURANCE

- A. 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 handrails and railings that are similar to those indicated for this Project in material, design, and extent.
- B. Source Limitations: Obtain each type of railing through one source from a single manufacturer.

1.5 STORAGE

- A. Store railings in a dry, well-ventilated, weathertight place.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate installation of anchorages for handrails and railings. 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.

1.8 SCHEDULING

- A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that do not satisfy structural performance requirements.

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. Steel and Iron Railings Components:
 - a. A & T Iron Works, Inc. (914)632-8992
2. Woven-Wire Mesh Panels
 - a. Newark Wire Works, Inc. (732)661-2001

2.2 METALS

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- B. Steel and Iron: Comply with the following requirements for each form required:
 1. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is indicated or required by structural loads.
 2. Steel Rails and Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
 3. Steel Plates, Channels, Shapes, and Bars: ASTM A 36/A 36M.
 4. Woven-Wire Mesh: Intermediate crimp rectangular pattern 1 1/2" x 3" woven-wire mesh made from .192 inch (4.9-mm) nominal diameter wire complying with ASTM A 510M.
 5. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510.
 6. Iron Castings: Gray iron complying with ASTM A 48, Class 30.
- C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
 1. Provide cast brackets with flange tapped for concealed anchorage to threaded hanger bolt.
 2. Provide formed or cast brackets with predrilled hole for exposed bolt anchorage.
 3. Provide formed steel brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.
 4. Provide brackets with interlocking pieces that conceal anchorage. Locate set screws on bottom of bracket.

2.3 MISCELLANEOUS MATERIALS

- A. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded or brazed and as required for color match, strength, corrosion resistance, and compatibility in fabricated items.

2.4 FASTENERS

- A. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.

1. For steel, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- B. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other Work, unless otherwise indicated.
- C. GROUT: Grout for fence posts shall be non-shrink, cement based grout such as Sonneborn 10K Grout as manufactured by ChemRex, Shakopee, MN or SikaGrout 212, as manufactured by Sika Corporation, Lyndhurst, NJ, or approved equal.
- D. SEALANT: Sealant around fence post shall be one part polyurethane, elastomeric adhesive such as Sonneborn's Ultra Sealant, as manufactured by ChemRex, Shakopee, MN or Sikaflex-1a, as manufactured by Sika Corporation, Lyndhurst, NJ, or approved equal.

2.5 PAINTING FENCE POSTS AND GATES:

- A. The fence posts and gate cages shall receive three (3) coats of paint. The first coat shall be shop applied; the second and third coat shall be field applied. Immediately prior to painting, all surfaces of fences and gates shall be thoroughly free of debris. All surfaces that are rust free shall be treated in accordance with SP-1, Solvent Cleaning. Treatment shall be performed with a solvent such as mineral spirits, xylol, or turpentine to remove all dirt, grease, and foreign matter. Surfaces that show evidence of scale and rust shall be cleaned in accordance with SP-2, Hand Tool Cleaning, a method generally confined to wire-brushing, sandpaper, hand scrapers, or hand impact tools or SP-3, Power Tool Cleaning, a method generally confined to power wirebrushes, impact tools, power sanders, and grinders in order to achieve a sound substrate. After the fence and gates have been cleaned and prepared, they shall be painted as follows:
- B. First Coat (Shop Applied): Sherwin Williams # E41N1 Metal Primer, Brown, as manufactured by Sherwin Williams Company, Woodside, NY, or approved equal. Primer is an alkyd oil, flat finish coating having a dry film thickness of 3 to 4 mils. Paint requires twenty-four (24) hours drying time before recoating. Performance shall meet or exceed the standards of Federal Specification TT-P-86H.
- C. Second Coat (Field Applied): Sherwin Williams High Solids Alkyd Metal Primer, B50 Series, Reddish Brown, or approved equal. Primer is an alkyd low luster coating having a dry film thickness of 3-5 mils. Paint requires four (4) hours drying time before recoating (with alkyds)

- D. Third Coat (Field Applied): Sherwin Williams Steel Master 9500 Silicone Alkyd # B56-300 Black, or approved equal. Topcoat silicone alkyd high gloss coating having a dry film thickness of 2-4 mils. Paint requires sixteen (16) hours drying time @ 77 degrees F.
- E. All paints shall be applied when ambient air temperature is forty-five (45) degrees F. and rising and when surfaces to be painted are moisture free. No painting will be allowed below the minimum ambient air temperature. In addition, no painting will be allowed below the temperature at which moisture will condense on surfaces. Refer to the Dew Point Chart in Section C, Article 16 to find the minimum allowed moisture free temperature.

2.6 POWDER COATING FENCE PANELS:

- A. Fence and gate panels shall receive corrosion resistant treatment followed by two step powder coating as follows:
- B. Corrosion Resistant Treatment: All fabrication and welding shall be completed prior to application of the corrosion resistant coating, metal pieces shall be cleaned of all weld spatter, mill scale, varnish, rust, grease, and the like and the surface mechanically or chemically prepared to receive the coating. This corrosion resistant coating shall be a multi-step iron phosphate bath coating process.
- C. Polyester Powder Coating shall be applied to the iron phosphate coated metal pieces in such a manner that the coating will not peel off. The manufacturer shall perform all processes required to achieve a smooth material bond. The surface coat shall be an electrostatically sprayed, lead-free, TGIC (triglycidyl isocyanurate) polyester powder coating applied to a minimum of 5 mil thickness (total) applied in two applications. Each powder application shall be oven cured at temperatures between 400 and 450 degrees Fahrenheit for a period of 20 minutes. The TGIC polyester powder coating shall be Secural by Spraylat, Mt. Vernon, NY; or Tiger Drylac Series 49 as manufactured by Tiger Drylac U.S.A., Reading, PA, or approved equal. Finished surfaces shall comply with ASTM Standard as follows:

D.	<u>PHYSICAL PROPERTIES</u>	<u>TEST METHODS</u>	<u>ACCEPTANCE CRITERIA</u>
	1. Adhesion cross hatching	D-3359B	5B (0% area removed)
	2. Flexibility conical mandrel	D-522	Pass 3/8" mandrel
	3. Pencil hardness	D-3363	Pencil hardness 2H minimum
	4. Impact resistance	D-2794	140 inch pounds minimum
	5. Overbake resistance-Adhesion	D-2454	5B
	6. Overbake resistance-Hardness	D-2454	Pencil hardness 2H minimum

7. Overbake resistance-Direct Impact	D-2454	140 inch pounds minimum
8. Humidity resistance-250 hours	D-4585	No visible change to surface
9. Weatherability	D-822	No visible change to surface

2.7 FABRICATION

- A. Assemble handrails and railings in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- B. Form changes in direction of railing members as follows:
 - 1. As detailed.
- C. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections 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 flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- D. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
- E. Provide inserts and other anchorage devices to connect handrails and railings to concrete or masonry. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
- F. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- G. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- H. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

- I. Provide weep holes or another means to drain entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources.
- J. Fabricate joints that will be exposed to weather in a watertight manner.
- K. Close exposed ends of railing members with prefabricated end fittings.
- L. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch or less.

2.8 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 shipment.

2.9 STEEL AND IRON FINISHES

- A. Galvanized Handrails and Railings: Hot-dip galvanize exterior steel and iron handrails and railings to comply with ASTM A 123. Hot-dip galvanize hardware for exterior steel and iron handrails and railings to comply with ASTM A 153/A 153M.
- B. Fill 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.
- C. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- D. For ungalvanized steel handrails and railings, provide ungalvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- E. Preparation for Shop Priming: After galvanizing, thoroughly clean handrails and railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.
- F. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed handrails and railings:
 - 1. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning."

- G. Apply shop primer to prepared surfaces of handrails and railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Do not apply primer to galvanized surfaces.
 - 2. Stripe paint edges, corners, crevices, bolts, and welds.
- H. Painted Finish: Comply with Section 2.5 of this specification.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing handrails and railings. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust handrails and railings before anchoring to ensure alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.2 ATTACHING HANDRAILS TO WALLS

- A. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets to building construction as follows:
 - 1. For solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.

3. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

3.3 ANCHORING POSTS

- A. Anchor posts to metal surfaces with flanges, angle or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 1. For steel railings, weld flanges to post and bolt to metal supporting members.
- B. Install removable railing sections, where indicated, in slip-fit metal sockets cast into concrete.

3.4 CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.5 PROTECTION

- A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05721

SECTION 06100 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Rooftop equipment bases and support curbs.
 - 2. Wood blocking, cants, and nailers.
 - 3. Wood furring and grounds.
 - 4. Sheathing.
 - 5. Building wrap.
- B. Related Sections include the following:
 - 1. Division 6 Section "Finish Carpentry" for nonstructural carpentry items exposed to view and not specified in another Section.

1.3 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority.
 - 3. SPIB - Southern Pine Inspection Bureau.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
 - 5. WWPA - Western Wood Products Association.

1.4 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, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 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, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

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. Gypsum Sheathing Board:

- a. G-P Gypsum Corporation.
2. Building Wrap:
 - a. Celotex Corporation (The); Building Products Division.
 - b. DuPont (E. I. du Pont de Nemours and Company).
 - c. Raven Industries, Inc.
 - d. Reemay, Inc.
 - e. Simplex Products.
 - f. Sto-Cote Products, Inc.

2.2 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. 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.
 3. Provide dressed lumber, S4S, unless otherwise indicated.
 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.3 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA C2.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 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 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, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat all rough carpentry, unless otherwise indicated.

2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
 2. Use treatment that does not promote corrosion of metal fasteners.
 3. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.5 SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
1. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum Corp.
 2. Type and Thickness: Type X, 5/8 inch thick.
 3. Size: 48 by 96 inches for vertical installation

2.6 BUILDING WRAP

- A. Building Wrap: Air-retarder sheeting made from polyolefins; cross-laminated films, woven strands, or spun-bonded fibers; coated or uncoated; with or without perforations; and complying with ASTM E 1677, Type I.
1. Thickness: Not less than 3 mils.
 2. Permeance: Not less than 10 perms.
 3. Flame-Spread Index: 25 or less per ASTM E 84.
 4. Allowable Exposure Time: Not less than three months.
- B. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building wrap manufacturer for sealing joints and penetrations in building wrap.

2.7 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including the following:
1. Rooftop equipment bases and support curbs.
 2. Blocking.
 3. Cants.
 4. Nailers.

5. Furring.
 6. Grounds.
- B. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine, No. 2 grade; SPIB.
 2. Hem-fir or Hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or Spruce-pine-fir, Construction or 2 Common grade; NELMA, NLGA, WCLIB, or WWPA.
 4. Eastern softwoods, No. 2 Common grade; NELMA.
 5. Northern species, No. 2 Common grade; NLGA.
 6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.
- C. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.8 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.9 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening 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.
- F. Lag Bolts: ASME B18.2.1..
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 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.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

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, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
 - 2. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.
- E. 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 between members. Install fasteners without splitting wood; predrill as required.
- F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD GROUND, 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. Build anchor bolts into masonry during

installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 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.

END OF SECTION 06100

SECTION 06200 FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior standing and running trim for field- finish.
- B. Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
 - 2. Division 6 Section "Interior Architectural Woodwork" for shop-fabricated interior woodwork.
 - 3. Division 9 Section "Painting" for finishing of finish carpentry.

1.3 DEFINITIONS

- A. Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NHLA - National Hardwood Lumber Association.
 - 3. NLGA - National Lumber Grades Authority.
 - 4. SCMA - Southern Cypress Manufacturers Association.
 - 5. SPIB - Southern Pine Inspection Bureau.
 - 6. WCLIB - West Coast Lumber Inspection Bureau.
 - 7. WWPA - Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Include construction details, material descriptions, dimensions of individual components and profiles, textures, and colors.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer.
- B. Fire-Test-Response Characteristics: Where fire-retardant materials are indicated, provide materials with specified fire-test-response characteristics as determined by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency on surfaces of materials that will be concealed from view after installation.

1.6 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Include construction details, material descriptions, dimensions of individual components and profiles, textures, and colors.
 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
- B. Deliver interior finish carpentry only when environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit work to be performed according to manufacturer's written instructions and warranty requirements and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by the American Lumber Standards' Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated lumber and plywood are indicated, use materials impregnated with fire-retardant chemicals by a pressure process or other means acceptable to authorities having jurisdiction to produce products with the following fire-test-response characteristics:
 - 1. Flame-spread index of not greater than 25 when tested according to ASTM E 84.
- B. Interior, Low-Hygroscopic-Type, Fire-Retardant Treatment: Formulation that results in treated material with an apparent moisture content of not more than 28 percent when tested according to ASTM D 3201 at 92 percent relative humidity.
- C. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber and plywood from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
- D. Kiln-dry material after treatment to levels required for untreated material. Do not use material that does not comply with requirements for untreated material or is warped or discolored.

2.3 EXTERIOR LUMBER

- A. Lumber for Clear-Finished Applications: Kiln-dried lumber with surfaced (smooth) face and of the following species and grade:
 - 1. Clear Heart VG (Vertical Grain) western red cedar.

2.4 INTERIOR STANDING AND RUNNING TRIM

- A. Lumber Trim for Opaque Finish (Painted): Finished lumber (S4S), either finger-jointed or solid lumber, of one of the following species and grades:
 - 1. Grade D Select eastern white pine; NELMA or NLGA.

2. Grade D Select (Quality) Idaho white, lodgepole, ponderosa, or sugar pine; NLGA or WWPA.
 3. Grade D Select white woods; WWPA.
 4. Grade Superior or C & Btr finish, Douglas fir-larch or Douglas fir south; NLGA, WCLIB, or WWPA.
 5. Grade 1 Common spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
 6. Grade A Finish alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; NHLA.
- B. Wood Molding Patterns: Provide stock moldings made to patterns as noted on the drawings manufactured by Dykes Lumber or an approved equal.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws of the following materials, in sufficient length to penetrate minimum of 1-1/2 inches into substrate, unless otherwise recommended by manufacturer:
1. Hot-dip galvanized steel.
- B. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- C. Fasteners for Exterior Fiber-Cement Siding: No. 8-18 x 0.375" head self drilling, corrosion resistant S-12 ribbed buglehead screws.

2.6 FABRICATION

- A. Wood Moisture Content: Comply with requirements of specified inspection agencies and with manufacturer's written recommendations for moisture content of finish carpentry at relative humidity conditions existing during time of fabrication and in installation areas.
- B. Back out or kerf backs of the following members, except members with ends exposed in finished work:
1. Interior standing and running trim, except shoe and crown molds.
- C. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.
- C. Prime lumber for exterior applications to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Division 9 Section "Painting."

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 4. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end

joints. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

1. Install trim after gypsum board joint finishing operations are completed.
2. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

- A. Replace finish carpentry that is damaged or does not comply with requirements. Finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

- A. Clean finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 06200

SECTION 06402
INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
1. Interior standing and running trim.
 2. Wood cabinets.
 3. Interior ornamental work.
 4. Flush wood paneling.
 5. Wood countertops, if specified on drawings.
 6. Plastic-laminate countertops, if specified on drawings..
 7. Shop finishing interior woodwork.
- B. Related Sections include the following:
1. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 2. Division 6 Section "Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.
 3. Division 8 Section "Flush Wood Doors."
 4. Division 9 Section "Painting" for field finishing of interior architectural woodwork.

1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories, and finishing materials and processes.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 2. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
- C. Samples for Verification: For the following:
1. Lumber with or for transparent finish, 5 inches wide by 24 inches long, for each species and cut, finished on 1 side and 1 edge.
 2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
 3. Wood-veneer-faced panel products with or for transparent finish, 12 by 24 inches, for each species and cut. Include at least one face-veneer seam and finish as specified.
 4. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
 5. Corner pieces as follows:
 - a. Cabinet front frame joints between stiles and rail, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
 6. Exposed cabinet hardware and accessories, one unit for each type and finish.
- D. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

- B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork.
- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.
 - 1. Provide AWI Quality Certification Program labels indicating that woodwork complies with requirements of grades specified.
- E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- F. Mockups: Before fabricating and installing interior architectural woodwork, build mockups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be fabricated and installed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting interior architectural woodwork fabrication.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored

in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species and Cut for Transparent Finish: Clear Red Oak, to match Architect's sample.
- C. Wood Products: Comply with the following:
 - 1. Softwood Plywood: DOC PS 1,
 - 2. Hardwood Plywood and Face Veneers: HPVA HP-1.
 - 3. Medium-Density Fiberboard: ANSI A208.2, Grade MD.

- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. 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. Lamin-Art, Inc.
 - c. Nevamar Company, LLC; Decorative Products Div.
 - d. Westinghouse Electric Corp.; Specialty Products Div.
 - e. Wilsonart International; Div. of Premark International, Inc.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Use materials impregnated with fire-retardant chemical formulations indicated by a pressure process or other means acceptable to authorities having jurisdiction to produce products with fire-test-response characteristics specified.
 - 1. Do not use treated material that does not comply with requirements of referenced woodworking standard or that is warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with AWPA C20 (lumber) and AWPA C27 (plywood), for woodwork items indicated as fire-retardant treated. Use the following treatment type:
 - 1. Interior Type A: Low-hygroscopic formulation.
 - 2. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
 - 3. Kiln-dry material before and after treatment to levels required for untreated material.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware."
 - 1. Concealed adjustable hinges, Stanley, minimum two (2) per door. See Drawings.
 - 2. Door and drawer pulls: See Drawings.

3. Drawer slides, full extension, undercarriage type, 30 lb. capacity, cold rolled steel tracks, chrome plates nylon guides. steel ball bearings No. 308 manufactured by Grant Hardware Co. or an acceptable equal.
 4. Adjustable shelves: recessed standards No. 255 and No. 256 clips. Provide four (4) standards per cabinet and four (4) clips per shelf, brown plastic, Knape and Vogt or acceptable equal.
- B. Grommets for Cable Passage through Countertops: 2-inch OD, Ivory, molded-plastic grommets and matching plastic caps with slot for wire passage.

2.4 INSTALLATION MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.5 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Custom grade interior woodwork complying with the referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
 3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.
- E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening

devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

- F. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

2.6 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 300.
- B. Grade: Custom.
- C. For trim and rails items wider than available lumber, use veneered construction. Do not glue for width.
- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

2.7 PLASTIC-LAMINATE COUNTERTOPS

- A. Grade: Custom.
- B. High-Pressure Decorative Laminate Grade: HGS.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from manufacturer's full range.
- D. Edge Treatment: As indicated.
- E. Core Material: Particleboard or medium-density fiberboard Particleboard Medium-density fiberboard Particleboard made with exterior glue Medium-density fiberboard made with Exterior-grade plywood.
- F. Core Material at Sinks: exterior-grade plywood.
- G. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.

2.8 WOOD COUNTERTOPS FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 400 requirements for wood countertops.
- B. Grade: Custom.
- C. Wood Species and Cut for Exposed Surfaces: Clear Red Oak, to match Architect's sample.
- D. Type of Top: Panel product for transparent finish (wood veneer laminated over core) as follows:
 - 1. Matching of Adjacent Veneer Leaves: Book match.
 - 2. Matching of Adjacent Veneer Leaves: End match.
 - 3. Veneer Matching within Panel Face: Running match.
 - 4. Edge Treatment: Solid wood matching face for species and cut.
 - 5. Core Material: Fire-retardant Exterior-grade plywood.

2.9 FLUSH WOOD PANELING FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 500 requirements for flush wood paneling.
- B. Grade: Custom.
- C. Wood Species and Cut for Exposed Surfaces: Clear Red Oak, to match Architect's sample.
- D. Matching of Adjacent Veneer Leaves: Book match.
- E. Vertical Matching of Adjacent Veneer Leaves: End match.
- F. Veneer Matching within Panel Face: Running match.
- G. Panel-Matching Method: No matching between panels is required. Select and arrange panels for similarity of grain pattern and color between adjacent panels.
- H. Vertical Panel-Matching Method: End match.
- I. Fire-Retardant-Treated Paneling: Provide panels consisting of wood veneer and fire-retardant particleboard or fire-retardant medium-density fiberboard. Panels shall have flame-spread rating of 25 or less and smoke-developed rating of 450 or less per ASTM E 84.

2.10 WOOD CABINETS FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 400 requirements for wood cabinets.
- B. Grade: Custom.

- C. AWI Type of Cabinet Construction: As indicated.
- D. Wood Species and Cut for Exposed Surfaces: Clear Red Oak, to match Architect's sample.
 - 1. Grain Matching: Run and match grain vertically for drawer fronts, doors, and fixed panels.
 - 2. Matching of Veneer Leaves: Book match.
 - 3. Vertical Matching of Veneer Leaves: End match.
 - 4. Veneer Matching within Panel Face: Running match.
 - 5. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.
- E. Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: Match species and cut indicated for exposed surfaces.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber, same species indicated for exposed surfaces.
 - 3. Drawer Bottoms: Hardwood plywood, same species indicated for exposed surfaces.

2.11 INTERIOR ORNAMENTAL WORK FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 700.
- B. Grade: Custom.

2.12 STAIR HANDRAILS

- A. Quality Standard: Comply with AWI Section 800.
- B. Grade: Custom.
- C. Finish: Transparent.

2.13 SHOP FINISHING

- A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

- C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces.
- D. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523:
 - 1. Grade: Custom.
 - 2. AWI Finish System TR-4: Conversion varnish.
 - 3. Staining: Match Architect's sample.
 - 4. Wash Coat for Stained Finish: Apply a vinyl wash coat to woodwork made from closed-grain wood before staining and finishing.
 - a. Apply vinyl wash coat sealer after staining and before filling.
 - 5. Sheen: To match Architect's sample.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

- D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with recommendations of chemical treatment manufacturer, including those for adhesives used to install woodwork.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.
 - 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 - 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- G. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless covered by trim.
 - 1. Install flush paneling with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
- I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

- J. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

**SECTION 07115
BITUMINOUS DAMPPROOFING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Cold-applied, cut-back asphalt dampproofing.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of product specified, including data substantiating that materials comply with requirements for each dampproofing material specified. Include recommended method of application, recommended primer, number of coats, coverage or thickness, and recommended protection course.
 - 1. Certification by dampproofing manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed bituminous dampproofing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Single-Source Responsibility: Obtain primary dampproofing materials and primers from one source and by a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

- A. Substrate: Proceed with dampproofing only after substrate construction and penetrating work have been completed.

- B. Weather Limitations: Proceed with dampproofing only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements.
- C. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
 - 1. Cold-Applied, Asphalt Emulsion Dampproofing:
 - a. LATICRETE International, Inc., or equal.
 - b. W.R. Meadows, or equal.

2.2 BITUMINOUS DAMPPROOFING

- A. General: Provide products recommended by manufacturer for designated application.
 - 1. Odor Elimination: For interior and concealed-in-wall uses, provide type of bituminous dampproofing material warranted by manufacturer to be substantially odor free after drying for 24 hours under normal conditions.
- B. Cold-Applied, Asphalt Emulsion Dampproofing: Asphalt-based emulsions recommended by the manufacturer for dampproofing use when applied according to the manufacturer's instructions.
 - 1. Trowel Grade: Emulsified asphalt mastic, prepared with mineral- colloid emulsifying agents suitable for application in a relatively thick film, complying with ASTM D 1187, Type I.
 - 2. Trowel Grade: Emulsified asphalt mastic, prepared with mineral- colloid emulsifying agents and containing fibers other than asbestos, complying with ASTM D 1227, Type III or IV.

2.3 MISCELLANEOUS MATERIALS

- A. Primer: Asphalt primer complying with ASTM D 41, for asphalt-based dampproofing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrate of projections and substances detrimental to work; comply with recommendations of prime materials manufacturer.
- B. Install cant strips and similar accessories as shown and as recommended by prime materials manufacturer even though not shown.
- C. Fill voids, seal joints, and apply bond breakers, if any, as recommended by prime materials manufacturer, with particular attention at construction joints.
- D. Install separate flashings and corner protection stripping, as recommended by prime materials manufacturer, where indicated to precede application of dampproofing. Comply with details shown and with manufacturer's recommendations. Pay particular attention to requirements at building expansion joints, if any.
- E. Prime substrate as recommended by prime materials manufacturer.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's recommendations except where more stringent requirements are indicated and where Project conditions require extra precautions to ensure satisfactory performance of work.
- B. Application: Apply dampproofing to the following surfaces.
 - 1. Exterior surface of inside wythe of double-wythe, exterior masonry walls above grade, to prevent water-vapor penetration through the wall.
 - 2. Where indicated on the Drawings.
- C. For interior surfaces, provide only emulsified asphalt materials.

3.3 COLD-APPLIED, CUT-BACK ASPHALT DAMPPROOFING

- A. Trowel Grade: Trowel apply a coat of mastic asphalt dampproofing onto substrate at a minimum rate of 7 gal./100 sq. ft., to produce an average, dry-film thickness of 70 mils but not less than 30 mils at any point.

3.4 PROTECTION AND CLEANING

- A. Protect exterior, below-grade dampproofing membrane from damage until backfill is completed. Remove overspray and spilled materials from surfaces not intended to receive dampproofing.

END OF SECTION 07115

SECTION 07210 BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Insulation under slabs-on-grade.
 - 2. Concealed building insulation.
 - 3. Self-supported, spray-applied cellulosic insulation.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 2.
 - 2. Division 4 Section "Unit Masonry Assemblies" for cavity wall insulation.
 - 3. Division 7 Section "Firestopping" for safing insulation.
 - 4. Division 9 Section "Gypsum Board Assemblies" for acoustical insulation.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of insulation product specified.
- C. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities hav-

ing jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84 or UL 723.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

All concealed and exposed building insulation shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.

All foam plastic insulation shall flame spread index of not more than 75 and a smoke-developed index of not more than 450, where tested in the maximum thickness intended for use in accordance with ASTM E84 or UL 723 and shall be separated from the interior of the building by an approved thermal barrier as per Partition Types on Drawing A-800.

For All walls, floor-ceilings separating dwelling units:

Airborne Sound - Refer to Partition Type 1 and 1A: walls and partitions shall have STC rating of not less than 50.

Structure-borne Sound - Floor-ceiling assemblies shall have STC rating of not less than 50; and an impact insulation class rating of not less than 50.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the work include, but are not limited to, the following:
 1. Extruded-Polystyrene Board Insulation:

- a. DiversiFoam Products, or equal.
 - b. Dow Chemical Co.
 - c. UC Industries, Inc.; Owens-Corning Co.
2. Glass-Fiber Insulation:
 - a. **Owens-Corning Fiberglas Corporation: EcoTouch Pink Fiberglas Insulation with STC rating of 50 or greater, submit product data.**
 3. Self-supported, spray-applied cellulosic insulation.
 - a. Acustica Integral, Sonaspray K-13, or equal.

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths. Thickness and locations shall be as indicated on the drawings.
- B. Extruded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type and with other requirements indicated below:
 1. Type V, 3.00-lb/cu. ft. minimum density, unless otherwise indicated.
 2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.
 3. Recycled Content: Not less than 50 percent blend of postconsumer and recovered polystyrene resins.
 4. Under slab insulation board shall be high density type, with a compressive strength of 25 psi.
- C. Unfaced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I (blankets without membrane facing).
 1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.
 2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
- D. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.

2.3 SPRAY-APPLIED CELLULOSIC INSULATION

- A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), chemically treated for flame-resistance, processing, and handling characteristics.

2.4 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- B. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/4 inch thick, formed under heat and pressure, standard sizes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Apply single layer of insulation to produce thickness indicated.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF UNDER-SLAB INSULATION

- A. Protect top surface of horizontal insulation from damage during concrete work by applying protection board.
- B. Provide under-slab insulation at Level 1 and Level 2 slab on grade from column line B to W and under slab of room 100, 101, 101A and F-1. Provide under-slab insulation at Level 2 slab on grade between AB to AI and 9 to 16.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
 - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
- E. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
- F. Apply self-supported, spray-applied cellulosic insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make it flush with face of studs by using method recommended by insulation manufacturer.

3.6 PROTECTION

- A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

**SECTION 07410
PREFORMED STANDING SEAM METAL ROOFING**

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide the materials, labor, equipment, and services necessary to furnish, deliver, and install all work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 DESCRIPTION OF WORK

- A. Furnish labor, material, tools, equipment and services, and install new standing seam metal roofing, profiled fascia, and sheet metal trim.
- B. Coordinate standing seam metal roofing with work performed by other trades.
- C. Furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation, even though such items may not be specifically indicated.
- D. Install a row of snow guards along all roof eaves; install an additional row of snow guards in the field of the roof.
- E. Install .050 inch thick seamless aluminum gutters and leaders.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 06100 - Rough Carpentry
- B. Section 07600 - Sheet Metal Flashings & Accessories

1.4 CODE APPROVAL

- A. Install preformed standing seam metal roofing system components to meet minimum UL 90 requirements.

1.5 QUALITY ASSURANCE

- A. Applicable standards:
 - 1. SMACNA: "Architectural Sheet Metal Manual" Sheet Metal and Air Conditioning Contractors National Association, Inc.
 - 2. AISC: "Steel Construction Manual" American Institute of Steel Construction.
 - 3. ASI: "Cold Form Steel Design Manual" American Iron and Steel Institute.

4. ASTM A792-89: Standard Specification for Steel Sheet, Aluminum-Zinc Alloy coated by the Hot Dip Process, General Requirements.
 5. ASTM A527-90: Standard Specification for Steel Sheet, Aluminum-Zinc Alloy coated by the Hot Dip Process, Commercial Quality.
 6. ASTM A446-91: Standard Specification for Steel Sheet, Aluminum-Zinc alloy coated by the Hot Dip Process, Structural (Physical) Quality.
- B. Manufacturer's qualifications:
1. Ten years minimum continuous experience manufacturing roofing panels and accessory items, of the type specified, in a permanent indoor production facility.
- C. Installer's qualifications:
1. Five years minimum continuous company experience installing preformed panel roofing equal to the type specified.
 2. Provide an on site full time supervisor with five years experience installing preformed metal panel roofing, who speaks fluent English, when panel roofing work is in progress,

1.6 SUBMITTALS

- A. Shop Drawings:
1. Submit complete shop drawings and erection details which show the methods of erection, elevations, a plan view of the roof panels, sections, details, anticipated loads, flashings, roof curbs, vents, sealants, interfaces with related materials, and all accessory components and finishes.
 2. Do not manufacture the panels, accessory, or trim pieces prior to approval of shop drawings.
 3. Do not use the contract drawings prepared by the Architect for shop drawings.
- B. Samples:
1. Submit 3 inch x 5inch color chip samples which show the actual finish on a piece of sheet metal panel.
 2. Submit a 12inch long sample of a panel, the fastening clips, and all fasteners.
 3. Submit a full size snow guard clamp and 12 inch long section of bar.

1.7 GUARANTEE/WARRANTY

- A. Manufacturer's Warranties:

1. Provide a warranty issued by the panel Manufacturer, covering bare metal against rupture, structural failure, and perforation due to normal atmospheric corrosion exposure for a period of 20 years from the date of completion.
 2. Provide a warranty issued by the finish Manufacturer, covering the panel finish against cracking, checking, blistering, peeling, flaking, chipping, chalking, and fading for a period of twenty-five (20) years.
 3. Provide a warranty issued by the panel Manufacturer that provides for the replacement of any panels which leak, or otherwise fail to perform as warranted, at no cost to the Owner.
- B. Provide a Contractor's written Guarantee which warrants that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:
1. Defective work includes but is not limited to the following types of failure: leakage, delamination, lifting, loosening, splitting, cracking, and undue expansion.
- C. The Manufacturer's and the Contractor's Guarantees/Warranties shall provide that in the event the work installed fails to so perform, the Manufacturer and Contractor will make the repairs and modifications necessary to enable the work to perform as warranted, at their own expense.
- D. Manufacturer's and Contractor's Guarantees/Warranties shall be issued no more than 30 days before the satisfactory completion of punch list work.
- E. Guarantees/Warranties shall include the removal and replacement of items or materials superimposed over the metal panels as part of the original work, if removal is needed to effect warranty repairs.
- F. Guarantee/Warranty coverage may be cancelled, for the affected portion of the roof, if the work is damaged by winds in excess of 72 mph, by hail, lightning, insects or animals, by failure of the structural substrate, by exposure to harmful chemicals, by other trades on the roof, or by vandalism, or if the Owner fails to maintain the roof in accordance with, or makes roof alterations contrary to, the Manufacturers printed recommendations.
- G. Guarantee/Warranty coverage shall be reinstated, for the remainder of the original period, if the Owner restores the roof to the condition it was in prior to the damage occurring.

1.8 PRODUCT DELIVER, STORAGE AND HANDLING

- A. Deliver materials to the site, ready for use in the Manufacturer's original and unopened containers and packaging, bearing labels to indicate the type of material, brand name, and Manufacturer's name.

- B. Store materials under cover in a dry and clean location, off the ground. Immediately remove materials which are damaged or otherwise not suitable for installation from the job site, and provide replacement material needed to complete the installation as scheduled.
- C. Exercise extreme care when unloading, storing, and erecting panels to prevent bending, warping, twisting, and surface damage.

PART 2 - PRODUCTS

2.1 PANELS AND TRIM

- A. Products manufactured by Peterson Aluminum Corporation are specified to establish a standard of quality. Equal products manufactured by other companies will be acceptable if submitted with sufficient technical data to establish color, watertightness, appearance, functional, and warranty term equivalency.
- B. Panels: 16 inch wide architectural standing seam panels, fabricated from 22 gauge galvanized smooth texture steel, roll formed and furnished in continuous lengths from eave to ridge, with concealed fasteners and clips, and with 1-3/4 inch high seams as manufactured by Peterson Aluminum Corporation under the trade name Snap-Clad System.
- C. Panel Finish: Two coats Kynar 500 or Hylar 5000 finish, applied over a polyester base coat over a hot dipped galvanized base.
- D. Color: As selected from the full range of standard and custom colors.
- E. Fabricate hook strips, trim, flashing and accessories to the profiles shown, from the same material and thickness, and with the same finish as the panels, in consistent 8 or 10 foot lengths.

2.2 SUBSTRATE AND UNDERLAYMENTS

- A. 5/8 inch thick fire resistant gypsum board sheathing with inorganic glass mat facers and a water resistant core, formulated in 48 x 96 inch square edge boards, UL Class A, meeting ASTM C-1177, manufactured under the trade name Dens-Deck.
- B. 3/4 inch thick CDX plywood.
- C. Ice and Water Shield: 30 mil thick slip resistant, buytl based adhesive coated membrane, intended for use in high temperature applications under sheet metal roofing, with a plastic release layer for peel and stick application directly to a prepared roof deck: W. R. Grace Vycor Ultra.
- D. Underlayment: One ply of 30-pound asphalt saturated felt and one ply of 5-pound rosin paper.

2.3 SNOW GUARDS

- A. Clamp on snow guard system with S-5 clamps and ColorGard rail as manufactured by Alpine Snow Guards.

2.4 GUTTERS AND LEADERS

- A. .050 inch thick seamless aluminum gutters, fabricated from colored metal stock, prefinished to match the panel roofing and accessory trim, by Garrety Gutters phone 800/628-5849, mounted with concealed extruded aluminum fascia brackets, or brackets shop fabricated from 1-1/2 inch wide 1/8 inch thick aluminum stock, formed to hook onto the front edge of the gutter and be fastened through the back of the gutter with two screws in each bracket.
- B. .027 inch thick rectangular corrugated aluminum leaders, fabricated from colored metal stock, prefinished to match the panel roofing and accessory trim, mounted with 1-1/2inch wide 1/16 inch thick wrap around prefinished straps.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Inspect the structural deck and work of other trades and verify that such work is complete to a point where metal panel work may begin.
 - 2. Immediately notify the Architect and Construction Manager, if deficiencies are observed.
 - 3. Do not install substrate, underlayment or metal panel roofing until the deficiencies have been corrected.

3.2 SUBSTRATE INSTALLATION

- A. Install gypsum board over the steel deck surface, with joints between rows staggered at least 12 inches. Position boards with tight neat joints. Fill any gaps greater than 1/4 inch.
- B. Install the plywood over the gypsum board with joints between rows of plywood, and with joints between the plywood and gypsum board, staggered a minimum of 12 inches. Cut the plywood to fit neatly within 1/4 inch of penetrations and joints.
- C. Fasten the plywood through the gypsum board, only to the top flute of the steel deck, with #14 fluorocarbon polymer coated heavy duty screws, which penetrate through the deck a minimum of 3/4 inch and a maximum of 1-1/2 inches. Install 16 screws per 4 foot x 8 foot board.

3.3 UNDERLAYMENT INSTALLATION

- A. Install two three foot wide rows of ice and water shield fully adhered to the deck surface and lapped over the metal drip edge to shed water at all roof eaves.
- B. Install ice and water shield over the entire surface of louvered dormers, under hip and ridge flashings, 3 feet wide around all penetrations, under the metal valleys, and 1-1/2 feet wide on each side of metal valleys. Overlap the ice and water shield on to the metal valleys, plies and end laps, 6 inches minimum, to shed water.
- C. Lay felt over roof surfaces which are not covered with ice and water shield. Lap felt joints 6 inches toward eaves to shed water, and 6 inches at ends. Fasten felts with galvanized nails driven through tin buttons at 12inch centers.
- D. Install rosin paper over the felt, and ice and water shield, with 3 inch overlaps, just prior to the installation of metal panels, and keep the rosin paper dry at all times.
 - 1. Remove and replace rosin paper which gets wet; remove and replace metal roof panels if the rosin paper under them gets wet..

3.4 HOOK STRIP AND TRIM INSTALLATION

- A. Install hook strips, fascia, and hip and ridge trim pieces in full lengths, with the ends notched to form a telescoping 3inch overlap. Face the overlaps to shed water, and where visible from the ground, away from prominent building entrance locations. Set the trim overlap into a full bed of sealant which matches the color of the trim.

3.5 PANEL INSTALLATION

- A. Install panels in accordance with Manufacturer's installation instructions and shop drawings, so that they are weather tight, free of waves, warps, buckles, fastening stresses or distortions, with provisions for expansion and contraction.
- B. Install panels using concealed anchors spaced 2 feet on center along the eave and 3 feet on center in the field of the roof.
- C. Install panels plumb, level, and straight with seams and rib battens parallel, to achieve the design appearance indicated.

3.6 SNOW GUARD INSTALLATION

- A. Install the ColorGard snow guards with one clamp every other panel seam (32 inches on center), 12 inches up from the eave, along all eaves. Install a second row of ColorGard snow guard clamps 20 feet up slope from the first row where shown on the roof plan.
- B. Insert the color strip into the ColorGard cut from the same materials as the roof panels.

3.7 GUTTER AND LEADER INSTALLATION

- A. Install seamless gutters using concealed fascia brackets, spaced 12 inches on center. Fasten each bracket with two #10 by 1-1/2 inch long hex head stainless steel screws.
- B. Install gutters to slope approximately 1/16 inch per foot for drainage.
- C. Install leaders plumb, secured with leader straps spaced at the top and bottom of all runs, and uniformly approximately 7 feet apart in between. Install straps on all leaders at the same general elevation to achieve a neat overall installation. Fasten each leader strap with 1/4 inch diameter stainless steel removable pin Zamac type nail-ins.
- D. Install a wire basket strainer in the gutter tube outlet at all leaders.

3.8 CLEANING AND PROTECTION

- A. Dispose of excess materials and remove debris from site.
- B. Clean the finished panel surface, to remove fingerprints and construction dirt, and in accordance with panel finish manufacturer's recommendations.
- C. Touch up minor scratches and abrasions.
- D. Replace or repair to the satisfaction of the Architect, any work that becomes damaged prior to final acceptance.

END OF SECTION 07410

**SECTION 074213
PREFORMED METAL CLADDING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Supply and install profiled prefinished aluminum cladding and soffit forming a part of an exterior wall rainscreen system with girts, flashings and trims using prefinished sheet materials and concealed fasteners.

1.2 RELATED WORK

- A. Structural Steel Framing
- B. Structural Metal Stud Framing
- C. Rough Carpentry
- D. Insulation
- E. Bituminous Dampproofing and Vapor Barriers
- F. Sheet Metal Flashing and Trim
- G. Sealants

1.3 REFERENCES

- A. Aluminum Association, Inc. (AAI), Current edition
 - 1. DAF-45, Designation System for Aluminum Finishes
- B. American Architectural Manufacturers Association (AAMA), Current editions
 - 1. AAMA 508 - Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.
- C. American Society for Testing and Materials International, (ASTM), Current editions
 - 1. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 2. ASTM D523 - Standard Test Method for Specular Gloss.
 - 3. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints.
 - 4. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
 - 5. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - 6. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 - 7. ASTM D2248 - Standard Practice for Detergent Resistance of Organic Finishes.

8. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
 9. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test.
 10. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test.
 11. ASTM D4145 - Standard Test Method for Coating Flexibility of Pre-painted Steel.
 12. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
 13. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 14. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.
 15. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 16. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- D. U.S. Green Building Council (USGBC) - Current editions
1. LEED V4 for Building Design and Construction.
 2. LEED for New Construction and Major Renovations.
 3. LEED for Core and Shell Development.

1.4 SYSTEM DESCRIPTION

- A. Design Requirements
1. General Cladding Properties:
 - a. Fire Propagation - ASTM E84: Qualified
 - i. Flame Spread Index – ASTM E84: 0
 - ii. Smoke Developed Index – ASTM E84: 0
 - b. Combustibility – ASTM E136 Option A: passed
 - c. Pressure Equalization – AAMA 508: Pass
 - d. Static Water Penetration (15 psf) – AAMA 508: Pass
 - e. Dynamic Water Penetration – AAMA 508: Pass
 - f. Structural Loading – AAMA 508: Pass; Design Pressure = 80 psf
 2. High Performance Fluorocarbon Finish Coating:
 - a. Minimum Thickness - ISO 2360: 27 micrometers
 - b. Gloss - ASTM D523: 20-45%
 - c. Pencil Hardness - ASTM D3363: 2H
 - d. Toughness - ASTM D4145: 2T no rift
 - e. Adhesive Force - ASTM D3359: 4B
 - f. Impact Resistance - ASTM D2794: >100 kg.cm

- g. Abrasion Resistance - ASTM D968: 64.6 L/mil
 - h. Humidity Resistance - ASTM D714: 3000 hrs no blister
 - i. Boiling Water Resistance - ASTM D3359: passed
 - j. Salt-Spray Resistance - ASTM B117: 3000 hrs no blister
 - k. Acid Resistance - ASTM D1308: No effect
 - l. Alkali Resistance - ASTM D1308: Passed
 - m. Solvent Resistance - ASTM D2248: Passed
 - n. Color Retention - ASTM D2244: Delta E = 0.34
 - o. Chalk Resistance - ASTM D4214: No chalking
 - p. Gloss Retention - ASTM D2244: >80 percent
3. High Performance Powder Coated Finish: Decoral System USA Corporation, passes coating performance testing in accordance with AAMA 2604.
- a. Direct Inland, 45degree South-Florida, 48 month Inspection Report by Q-Lab Test Services
 - b. Direct Inland, 45degree South-Florida, 48 month Instrumental Color Report by Q-Lab Weathering Research
 - c. Gloss Retention - ASTM D523: 50%
 - d. Chalking – ASTM D4214 Test Method A: 8
 - e. Fade – ASTM D2244 : <5

1.5 PERFORMANCE REQUIREMENTS

- A. Maximum deflection not to exceed L/180 under system's own weight plus positive and negative wind loads as calculated in compliance with the authority having jurisdiction. Where deflection may be exceeded, install panel stiffeners in compliance with the manufacturer's installation instructions.
- B. Design sheet cladding to span continuously over at least four structural supports (three spans) and design fastening to structural supports to withstand factored loads in accordance with authority having jurisdiction and the project structural design.
- C. Calculate live load deflections in accordance with authority having jurisdiction and as modified by the requirements of this Section.
- D. Provide for thermal dimensional movement due to thermal changes. The product should not be installed where surface temperatures are anticipated to exceed 180°F (82°C).
- E. Install expansion joints to accommodate movement in wall system and between wall system and building structure, where these movements are caused by deflection of building structure, and accommodate these movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.
- F. Provide for positive drainage to the exterior of all water entering or condensation occurring within the system.

- G. Final review and acceptance of work completed by this Section shall be carried out by the Manufacturer's Representative.

1.6 LEED CREDIT CONTRIBUTIONS

- A. Provide required information in accordance with Section 01300 – Submittal Procedures.

1.7 SUBMITTALS

- A. Submit product data in accordance with Section 01300– Submittals:
 - 1. Submit manufacturer's printed product literature, specifications and datasheet.
 - 2. Submit WHMIS MSDS - Material Safety Data Sheets. Indicate VOC's:
 - a. Sealant materials during application and curing.
 - b. Finishing materials.
 - c. Insulation adhesives.
 - d. Paints.
 - e. Isolation coatings.
- B. Product Data: Submit manufacturer's product data, standard drawing details, and installation instructions for system and individual components.
 - 1. Indicate arrangement of cladding system including dimensions, wall openings, location of joints, profiles of inner and outer skin, types and locations of supports, fasteners, flashing, closures, compliance with design criteria and requirements of related work.
- C. Submit samples in accordance with Section 01 33 00 – Submittals:
 - 1. Submit duplicate 300 x 300mm samples of wall system, representative of materials, finishes and colors.
 - 2. Prior to ordering materials, provide to consultant the following for verification purposes: three samples of color of finish specified.
- D. Color Charts: Submit cladding manufacturer's color charts showing full range of standard colors and finishes.
- E. Close-out Submittals: Upon project completion, submit manufacturer's warranties, including limitations and conditions. Coordinate LEED Close-out Submittal requirements with Section 01 35 11 - LEED Requirements.
- F. Warranties: Submit manufacturer's product warranties and installer's installation warranty.

1.8 QUALITY ASSURANCE

- A. Coordinate requirements with Section 01 45 00 - Quality Control.
- B. Test Reports: certified test reports confirming compliance with specified performance characteristics and physical properties.

- C. Installer Qualifications: Engage experienced installer, with a minimum of five years experience, who has completed systems similar in material, design, and extent to that indicated for Project and with record of successful performance.
- D. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions, and manufacturer's warranty requirements.
 - 1. Participants: General Contractor, installation subcontractor, Construction Manager, Owner, Consultant, Architect, and Engineer.
 - 2. Review wall framing for potential interference and conflicts; coordinate layout and support provisions for interfacing work.
 - 3. Review construction schedule and confirm availability of products, installation personnel, equipment and facilities.
 - 4. Review regulatory, insurance and certification requirements.
 - 5. Review field quality control procedures.
- E. Mock-Ups: Mock up complete system at location as directed by Architect.
 - 1. Construct a portion of one exterior wall in location agreed upon by Architect to establish a standard of construction, workmanship, and appearance.
 - 2. Construct mock-up indicating relationship between wall cladding, air spaces, air/vapour retarder membrane, windows, and doors.
 - 3. Do not continue with work of this Section until Owner, Architect, Engineer has approved mock-up.
 - 4. Accepted mock-ups may be incorporated into the work of this Section.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Ordering: Conform to manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Deliver materials and components in manufacturers' unopened containers or bundles, fully identified by name, brand, type and grade. Prevent damage during unloading, storing and installation.
- C. Store, protect and handle materials and components in accordance with manufacturer's recommendations to prevent twisting, bending, mechanical damage, contamination and deterioration.
- D. Store materials off ground on clean pallets and keep clean, dry, and free of dirt and other foreign matter.

1.10 PROJECT/SITE CONDITIONS

- A. Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work

- B. Undertake installation work only when weather conditions meet manufacturers' specific environmental requirements and when conditions will permit work to be performed in accordance with manufacturer recommendations and warranty requirements.

1.11 WASTE MANAGEMENT AND DISPOSAL

- A. Separate waste materials for recycling in accordance with Section 01 74 21 - Waste Management and Disposal.
- B. Divert used metal cut-offs from landfill by disposal removed for disposal at the nearest metal recycling facility.
- C. Divert reusable materials for reuse at nearest used building materials facility.
- D. Divert unused sealants, and adhesive materials from landfill through disposal at hazardous material depot.

1.12 WARRANTY

- A. Manufacturer's Product Warranties:
 - 1. Cladding System: Fifteen Year Limited Product Warranty against physical defects of systems and products that are properly installed and maintained according to the manufacturer's published application instruction.
 - 2. Finish Coating: Fifteen Year Limited Product Warranty against physical defects of systems and products that are properly installed and maintained according to the manufacturer's published application instruction.
 - 3. Contractor's Labor Warrantees: Two year labor warranty, starting from date of Owner acceptance of completed work to cover repair of materials found to be defective as a result of installation errors.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. AL13 ARCHITECTURAL SYSTEMS™
- B. TERRITORY MANAGER: LORRIE ARACRI CONTACT INFO: 202 486 3583
LORRIE@AL13.com, www.AL13.com.

2.2 METAL SIDING

- A. Formed Aluminum Cladding: Tension levelled, aluminum in accordance with ASTM B209 and ANSI H35.1 alloy designation 6063 T5 and as follows:
 - 1. Plank Sizes: 144 inch x as per drawings. (3658mm x as per drawings).
 - 2. Weight: 1.35 lb/ft² (6.59 kg/m²)
 - 3. Profile: as per product spec on drawings.
 - 4. Finish: fluorocarbon coating per AAMA 2605.

5. Color: as per Architect's sample and drawings.
6. Acceptable Materials:
 - a. AL13 Plank System Siding and Soffit, as manufactured by Anenda Systems Inc.

2.3 ACCESSORIES

- A. Girts: Fabricated from minimum 0.05 inch (1.27mm) thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating; finish material visible after assembly of wall system to match aluminum cladding.
- B. Sub-Girts: Structural quality steel to ASTM A653, with Z275 zinc coating to ASTM A792, adjustable double-angle profile as indicated to accept cladding with structural attachment to building frame.
- C. Extrusions: 144 inch (3658mm) long, corners and caps to profile for application.
- D. Clips: Four inch (102mm) long system clips
- E. Fasteners for System Clips:
 1. Attachment of Clips to Steel Substrate: #12-14 x 1 1/2 inch (38mm) drill-point fasteners with EPDM composite washers and corrosion-resistant coating. Installed every 32 inches (81.28cm) on center.
 - a. Acceptable Materials:
 - i. #12-14 x 1 1/2 inch AL13 Hex-Head Fastener, coated with drill-point.
 2. Attachment of Clips to Wood Substrate: #12- 14 x 1 3/4 inch (44.45mm) mini drill-point fasteners with EPDM composite washers and corrosion-resistant coating. Installed every 32 inches (81.28cm) on center
 - a. Acceptable Materials:
 - i. #12-14 x 1 3/4 inch AL13 Hex-Head Fastener, coated with mini drill-point.
 3. Fastener Corrosion Resistance:
 - a. Carbon Steel: Coated to provide not less than 1,700 hours of ASTM B 117 salt spray performance with no white or red rust; 18 cycles of ASTM G 87 (DIN 50018) SO² Kesternich testing with not more than 15 percent red rust.
- F. Fasteners for Frame Components:
 1. Attachment of System frame components to Steel Substrate: #10-16 x 3/4 inch (19.05mm) self-drilling screws with corrosion-resistant coating. Installed every 24 inches (60.96cm) on center.
 - a. Acceptable Materials:
 - i. #10-16 x 3/4 inch AL13 Hex-Head Fastener, coated with drill-point.
 2. Attachment of System frame components to Wood Substrate: #12-14 x 1 1/2 inch (38mm) mini drill-point fasteners with EPDM composite washers

and corrosion-resistant coating. Installed every 16 inches (40.64cm) on center, unless securing a segmented (3 ¼ inch) (8.25cm) backplate (installed 16 inches (40.64cm) on center), in which case two fasteners per segmented piece are required.

- a. Acceptable Materials;
 - i. #12-14 x 1 ½ inch AL13 Hex-Head Fastener, coated with mini drill-point.

3. Fastener Corrosion Resistance:

- a. Carbon Steel: Coated to provide not less than 1,700 hours of ASTM B 117 salt spray performance with no white or red rust; 18 cycles of ASTM G 87 (DIN 50018) SO² Kesternich testing with not more than 15 percent red rust.

- G. Isolation Tape: Manufacturers standard material for separating dissimilar metals from direct contact.
- H. Insulation Fastenings: Corrosion resistant, hot dipped galvanized bugle head screws with 1 ½ inch (38mm) diameter washer, one inch (25mm) minimum penetration into framing.
- I. Insulation: Rigid type as specified in Section 07210.
- J. Air/Vapour Retarder: Self-adhesive membrane..
- K. Sealant: as indicated in Section 07 92 00. Color of exposed sealant to match adjacent plank.
- L. Gaskets: formed from medium durometer Santoprene or EPDM.
- M. Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill and corners, of same material, thickness and finish as exterior cladding, brake formed to shape.
- N. Bituminous Coating: Cold-applied asphalt mastic, in accordance with CGSB 1.108, compounded for 15 mil (0.40mm) dry film thickness per coat with inert type non-corrosive compound free of asbestos fibres, sulphur components, and other deleterious impurities.
- O. Expansion joints: Install expansion joints as detailed in the project drawings. Joints shall allow for calculated structural movement and thermal changes of the planks.

2.4 FABRICATION

- A. Fabricate and finish cladding, and accessories at the factory to greatest extent possible using manufacturer's standard procedures and processes and conforming to indicated profiles and with dimensional and structural requirements.
- B. Fabricate cladding true, plumb and square, with no oil-canning or deformity that detracts from aesthetic appearance, matching quality and installation of accepted mock-up specified above.

- C. Apply bituminous coating or other permanent separation materials on concealed plank surfaces where cladding will be in direct contact with substrate materials that are not compatible or could result in corrosion or deterioration of either materials or finishes.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: comply with manufacturer's written recommendations or specifications, including current product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PREPARATION

- A. Installing contractor shall obtain field dimensions from job site before fabricating wall system.
- B. Ensure structural support is aligned, planar in acceptable condition.
- C. Building surfaces shall be smooth, clean and dry, and free from defects detrimental to the installation of the system. Notify Owner and Architect of conditions not acceptable for installation of system.
- D. Inspect wall system and components before installation and verify that there is no shipping damage.
- E. Do not install damaged planks; repair or replace as required for smooth and consistent finished appearance.

3.3 INSTALLATION

- A. Install cladding and components in accordance with manufacturer's published installation instructions and approved shop drawings.
- B. Ensure continuity of building envelope air barrier and vapor retarder systems.
- C. Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated in the project documents and manufacturer's standard details.
- D. Install outside corners, fillers and closure strips with carefully formed and profiled fabrications.
- E. Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.
- F. Attach components in manner not restricting thermal and structural movement.
- G. Seal junctions with adjoining work with approved sealant. Install sealant in accordance with Section 07 92 00.
- H. Apply isolation coating or membrane to areas of contact between dissimilar metals.

- I. Touch-Up Painting: Inspect completed wall system and apply matching touch-up paint, as needed, to correct minor paint flaws. Replace wall system components with major paint flaws or damage.

3.4 CONTROL/EXPANSION JOINTS

- A. Construct control and expansion joints as indicated in the project drawings.
- B. Use cover sheets, of brake formed profile, of same material and finish as adjacent material.
- C. Use mechanical fasteners to secure sheet materials.
- D. Assemble and secure wall system to structural frame so stresses on sealants are within manufacturers' recommended limits.

3.5 CONSTRUCTION

- A. Installation Tolerances: Shim and align cladding system within installed tolerance of 1/4 inch (6.3mm) in twenty feet (6100mm) on level, plumb, and location lines as indicated in the project drawings, and within 1/8 inch (3mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

- A. Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.
- B. Manufacturer's field services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- C. Schedule site visits to review Work at stages listed:
 - 1. After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 - 2. Twice during progress of Work at 25 percent and 60 percent complete.
 - 3. Upon completion of Work, after cleaning is complete.
- D. Submit reports to Consultant within three days of review.

3.7 CLEANING

- A. Perform cleaning after installation to remove construction and accumulated environmental dirt.
- B. Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe interior surfaces clean as part of final clean-up. Where surface contaminants are abrasive, use a light power wash with no wiping cloths in a first pass.

- C. Remove excess sealant with recommended solvent. DO NOT remove sealant with blades.
- D. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers from the job site.

END OF SECTION 074213

SECTION 074243 COMPOSITE WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Supply and install rain screen aluminum composite material ("ACM") architectural wall panels with snap-lock tab-over attachment system and accessories as required, to form a rain screen panel wall system over a framed and sheathed substrate.

1.2 RELATED REQUIREMENTS

- A. Structural Metal Stud Framing
- B. Rough Carpentry
- C. Insulation
- D. Bituminous Dampproofing and Vapor Barriers
- E. Sheet Metal Flashing and Trim
- F. Sealants

1.3 REFERENCES

- A. Aluminum Association, Inc. (AAI), Current edition
 - 1. DAF-45, Designation System for Aluminum Finishes.
- B. American Architectural Manufacturers Association (AAMA), Current editions
 - 1. AAMA 508 - Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.
 - 2. AAMA 2605 - Specification for Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- C. ASTM International (ASTM), Current editions
 - 1. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. ASTM D523 - Standard Test Method for Specular Gloss.
 - 4. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica.
 - 5. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints.
 - 6. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - 7. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.

8. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 9. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 10. ASTM D2248 - Standard Practice for Detergent Resistance of Organic Finishes.
 11. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
 12. ASTM D3359 – Standard Test Methods for Rating Adhesion by Tape Test.
 13. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test.
 14. ASTM D4145 – Standard Test Method for Coating Flexibility of Prepainted Sheet.
 15. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
 16. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 17. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 18. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 19. ASTM E1288 – Standard Test Method for The Durability of Biomass Pellets.
- D. International Organization for Standardization (ISO), Current edition
1. ISO 2360 - Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating thickness - Amplitude-sensitive eddy-current method.
- E. National Fire Protection Association (NFPA), Current edition
1. NFPA 285 - Standard Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
- F. U.S. Green Building Council (USGBC), Current edition
1. LEED V4 for Building Design and Construction
 2. LEED V4.1 for Building Design and Construction

1.4 SYSTEM DESCRIPTION

- A. Architectural panel system comprised as follows:
1. Aluminum-faced polyethylene core panels with high performance fluorocarbon finish coating.
 2. Extruded aluminum panel frame and perimeter frame assembly, including back plates, top caps, inside and outside corner frames, and end frames.

3. Fiberglass reinforced plastic ("FRP") system clips.
4. Adhesive tape for permanent adhesion of I-beam stiffeners to the back side of the ACM panel to reduce deflection.
5. Extruded aluminum snap-lock top cap with high performance fluorocarbon finish for final attachment of panels to frame assembly.

B. Design Requirements

1. Structural Design: Composite wall panel system capable of withstanding dead loads, wind loads, snow loads and normal thermal movement without evidence of buckling, oil canning or other permanent deformation of assemblies or components.
2. General Panel Properties:
 - a. Thermal Expansion: ASTM D696, 2.4×10^{-5} per degree C
 - b. Fire Propagation: ASTM E84
 - i. Polyurethane Core to ASTM E84
 1. Smoke Developed = 5
 2. Flame Spread = 20
 - ii. Fire Rated Core to ASTM E84
 1. Smoke Developed = 30
 2. Flame Spread = 0
 - c. Wind-Pressure Resistance: ASTM E330: Tested. See Technical Data Sheet (Wind Loads).
 - d. Pressure Cycling: ASTM E1288: Passed 100 cycles.
3. High Performance Fluorocarbon Finish Coating:
 - a. Minimum Thickness - ISO 2360: 27 micrometers
 - b. Gloss - ASTM D523: 20-45%
 - c. Pencil Hardness - ASTM D3363: 2H
 - d. Toughness - ASTM D4145: 2T no rift
 - e. Adhesive Force - ASTM D3359: 4B
 - f. Impact Resistance - ASTM D2794: >100 kg.cm
 - g. Abrasion Resistance - ASTM D968: 64.6 L/mil
 - h. Mortar Resistance - AAMA 2605.2: 24 hrs no blister
 - i. Humidity Resistance - ASTM D714: 3000 hrs no blister
 - j. Boiling Water Resistance - ASTM D3359: passed
 - k. Salt-Spray Resistance - ASTM B117: 3000 hrs no blister
 - l. Acid Resistance - ASTM D1308: No effect
 - m. Alkali Resistance - ASTM D1308: Passed
 - n. Solvent Resistance - ASTM D2248: Passed
 - o. Colour Retention - ASTM D2244: Delta E = 0.34
 - p. Chalk Resistance - ASTM D4214: No chalking
 - q. Gloss Retention - ASTM D2244: >80 percent

1.5 ACTION SUBMITTALS / INFORMATION SUBMITTALS

- A. LEED Submittals: Coordinate LEED submittal requirements with Section 01 35 11 - LEED Requirements.
- B. Product Data: Submit manufacturer's product data, standard drawing details, installation instructions and Material Safety Data Sheets (MSDS) for system and individual components.
- C. Submit shop drawings in accordance with Section 01 33 00 – Submittals:
 - 1. Indicate layout, profiles and product components including anchorage, accessories, finish colors and textures.
 - 2. Include details showing thickness and dimensions of the various system parts, fastening and anchoring methods, locations of joints and gaskets and location and configuration of movement joints.
 - 3. Include references for wind load requirements.
- D. Color Charts: Submit panel manufacturer's color charts showing full range of standard colors and finishes.
- E. Close-out Submittals: Upon project completion, submit manufacturer's warranties, including limitations and conditions. Coordinate LEED Close-out Submittal requirements with Section 01 35 11 - LEED Requirements.
- F. Warranties: Submit manufacturer's product warranties.

1.6 QUALITY ASSURANCE

- A. Coordinate requirements with Section 01 45 00 - Quality Control.
- B. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- C. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions, and manufacturer's warranty requirements.
 - 1. Participants: General Contractor, installation subcontractor, Owner, Architect, and Engineer.
 - 2. Review wall framing for potential interference and conflicts; coordinate layout and support provisions for interfacing work.
 - 3. Review construction schedule and confirm availability of products, installation personnel, equipment and facilities.
 - 4. Review regulatory, insurance and certification requirements.
 - 5. Review field quality control procedures.
- D. Mock-Ups: Mock up complete system at location as directed by Architect, Engineer.
 - 1. In mock-up, demonstrate prepared substrate, support/attachment framing, panel façade, exterior finishes and aesthetic appearance.
 - 2. Verify mock-up as conforming to manufacturer's instructions and provisions of Contract Documents.

3. Do not commence work of this Section until after mock-up has been accepted in writing by Architect, Engineer and Owner.
4. Protect and maintain accepted mock-up as standard of quality for work of this Section.
5. Accepted mock-ups may be incorporated into the work of this Section with written acceptance and approval by Architect and Engineer.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Ordering: Conform to manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Deliver materials and components in manufacturers' unopened containers or bundles, fully identified by name, brand, type and grade. Prevent damage during unloading, storing and installation.
- C. Store, protect and handle materials and components in accordance with manufacturer's recommendations to prevent twisting, bending, mechanical damage, contamination and deterioration.
- D. Store materials off ground on clean pallets and keep clean, dry, flat, and free of dirt and other foreign matter.
- E. Do not expose panels with strippable film to direct sunlight or extreme heat.

1.8 PROJECT/SITE CONDITIONS

- A. Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work
- B. Undertake installation work only when weather conditions meet manufacturers' specific environmental requirements and when conditions will permit work to be performed in accordance with manufacturer recommendations and warranty requirements.

1.9 WASTE MANAGEMENT AND DISPOSAL

- A. Separate waste materials for recycling in accordance with local requirements.

1.10 WARRANTY

- A. Manufacturer's Product Warranties:
 1. Panel System: Fifteen Year Limited Product Warranty against physical defects of systems and products that are properly installed and maintained according to the manufacturer's published application instruction.
 2. Finish Coating: Twenty Year Limited Finish Warranty against the following:
 - a. Peeling and checking of finish, except slight crazing or cracking as may occur on tightly roll-formed edges or brake bends at time of forming.

- b. Chalking of exterior paint in excess of eight when measured in accordance with ASTM D4214
 - c. Fading or color changes in excess of five color difference units when measured in accordance with ASTM D2244 on exposed painted surfaces.
 3. Contractor's Labor Warrantees: Two-year labor warranty, starting from date of Owner acceptance of completed work, to cover repair of materials found to be defective as a result of installation errors.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. AL13 ARCHITECTURAL SYSTEMS™, Tel: 855-438-2513,
- B. TERRITORY MANAGER, LORRIE ARACRI Contact info: 202 486 3583 Email: Lorrie@AL13.com, www.AL13.com.

2.2 ARCHITECTURAL PANELS

- A. Aluminum-faced composite architectural panels:
 1. Panel Size: Custom sizes as required up to 5 feet x 10 feet (1524mm x 3048mm).
 2. Panel Thickness: as specified.
 3. Core Material: polyethylene.
 4. Panel Weight:
 - a. Polyethylene core:
 - i. 0.12 inch/0.02 inch (3mm/0.50mm): 0.96 lb/ft² (4.71 kg/m²)
 - ii. 0.16 inch/0.02 inch (4mm/0.50mm): 1.17 lb/ft² (5.71 kg/m²)
 - b. Fire-rated mineral core:
 - i. 0.12 inch/0.12 inch (3mm/0.40mm): 1.27 lb/ft² (6.20 kg/m²)
 - ii. 0.16 inch/0.02 inch (4mm/0.50mm): 1.68 lb/ft² (8.18 kg/m²)
 5. Aluminum face sheets: AA A3003-H24 alloy aluminum sheet with nominal thickness of 0.020 inches (0.5mm).
 6. Finish: fluorocarbon coating per AAMA 2605.
 7. Color: as selected by Architect.
 8. Acceptable Materials:
 - a. AL13 Architectural Panels as manufactured by Anenda Systems Inc.

2.3 ATTACHMENT FRAMING

- A. Girts: Fabricated from minimum 18-gauge (1.27mm) thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating. Material visible after assembly of wall panel shall be finished to match aluminum panels.

- B. Sub-girts: Structural quality steel to ASTM A653, with Z275 zinc coating to ASTM A792, adjustable double-angle profile as indicated to accept panel with structural attachment to building frame.
1. Back Plates, Corner Frames and End Frames: AA 6063-T5 extruded aluminum, wall thickness generally 0.062 inches (1.57mm) thick.
 2. Panel Joint Top Caps: AA 6063-T5 extruded aluminum snap-lock top cap providing 1.83 inches (46.5mm) wide flat cap and 0.51 inches (13mm) deep reveal by 0.52 inches (13.1mm) [at bottom] to 0.59 inches (15.1mm) [at top]. The reveal has drafted side walls of five degrees.
 3. Coating: High performance fluorocarbon finish.
 4. Color: as selected by Architect.
 5. Acceptable Materials:
 - a. As recommended by manufacturer.

2.4 ACCESSORIES

- A. AL13 adhesive tape for permanent adhesion of I-beam stiffeners to the back side of the ACM panel for added panel rigidity (optional application).
1. Acceptable Material: AL13 Adhesive Tape as manufactured by Anenda Systems Inc.
- B. Fasteners:
1. Attachment of System frame components to Steel Substrate: #10-16 x $\frac{3}{4}$ inch (19.05mm) self-drilling screws with corrosion-resistant coating. Installed every 24 inches (60.96cm) on center.
 - a. Acceptable Materials:
 - i. #10-16 x $\frac{3}{4}$ inch AL13 Hex-Head Fastener, coated with drill-point.
 2. Attachment of System frame components to Wood Substrate: #12-14 x 1 $\frac{1}{2}$ inch (38mm) mini drill-point fasteners with EPDM composite washers and corrosion-resistant coating. Installed every 16 inches (40.64cm) on center, unless securing a segmented (3 $\frac{1}{4}$ inch) (8.25cm) backplate (installed 16 inches (40.64cm) on center), in which case two fasteners per segmented piece are required.
 - a. Acceptable Materials:
 - i. #12-14 x 1 $\frac{1}{2}$ inch AL13 Hex-Head Fastener, coated with mini-drill point.
 3. Attachment of System frame components to Concrete Walls: 1/4 inch (6.35mm) diameter threaded stainless steel concrete screw anchor. Minimum embedment into concrete of 1 $\frac{1}{4}$ inch (31.75mm). Ultimate withdrawal resistance shall be a minimum of 750 lbf. Installed every 24 inches (60.96cm) on center.
 - a. Acceptable Materials:
 - i. $\frac{1}{4}$ inch stainless steel AL13 Hex-Head Anchor, with matched tolerance drill bit.

- b. For larger installed areas over concrete, it is recommended to install a furring bar or Z-girt for panel attachment. Attaching frame components directly to concrete is time consuming.
- 4. Fastener Corrosion Resistance:
 - a. Carbon Steel: Coated to provide not less than 1,700 hours of ASTM B117 salt spray performance with no white or red rust; 18 cycles of ASTM G87 (DIN 50018) SO² Kesternich testing with not more than 15 percent red rust.
 - b. Stainless Steel: 304, 305, or 316 Series Stainless Steel.
- C. Isolation Tape: Manufacturers standard material for separating dissimilar metals from direct contact.
- D. Insulation Fastenings: Corrosion resistant, hot dipped galvanized bugle head screws with 1 1/2 inch (38mm) diameter washer, one inch (25 mm) minimum penetration into framing.
- E. Insulation: Rigid type as specified in Section 072113.
- F. Air/Vapor Retarder: Self-adhesive membrane.
- G. System Sealants: Sealants within the panel system, as recommended by manufacturer, color to match adjacent surface.
- H. Gaskets: Santoprene or EPDM.
- I. Flashings: Fabricate flashing from 0.062 inch (1.57mm) minimum thickness aluminum sheet. Where exposed to view, finish to match adjacent panels. Provide lap strip under flashing at abutted conditions; with lapped surfaces sealed with a full-bed of non-hardening sealant.

2.5 FABRICATION

- A. Aluminum wall panels and components shall comply with details as indicated on shop drawings.
- B. All components shall be factory fabricated ready for field installation. All components shall match quality and installation of accepted mock-up specified above.
- C. Tolerances:
 - 1. Panel bow shall not exceed 0.8 percent of panel overall dimension in width or length.
 - 2. Panel dimensions shall allow for field adjustment and thermal movement.
 - 3. Panel lines, breaks and curves shall be sharp, smooth and free of warps or buckles.
 - 4. Panel shall be visually flat.
 - 5. Panel surfaces shall be free of scratches or marks caused during fabrication or installation.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PREPARATION

- A. Installing Contractor shall obtain all dimensions from job site.
- B. Ensure all structural support is aligned, planar and in acceptable condition.
- C. Building surfaces shall be smooth, clean and dry, and free from defects detrimental to the installation of the system. Notify Owner or Architect of conditions not acceptable for installation of system.
- D. Inspect wall system and components before installation and verify that there is no shipping damage.
- E. Do not install damaged panels; repair or replace as required for smooth and consistent finished appearance.

3.3 INSTALLATION

- A. Install panel system and components in accordance with manufacturer's published installation instructions and shop drawings.
- B. Ensure continuity of building envelope air barrier and vapor retarder systems.
- C. Erect components plumb and true.
 - 1. Attachment system shall allow for vertical and horizontal thermal movement due to thermal changes. The product shall not be installed where surface temperatures are anticipated to exceed 180°F (82°C). Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement shall not be permitted.
- D. Drill 0.25 inch (6.35mm) drainage weep holes length of horizontally oriented bottom end frames located at base of panelized wall areas as recommended by building envelope engineer.
- E. Adjust assembly to secure panels safely to wall while allowing for expansion and contraction of components. Ensure extrusion tabs overlap panel edges by at least half of extrusion tab depth.
- F. Do not install defective component parts, including warped, bowed, dented, abraded, and broken members.
- G. Do not cut, trim, weld, or braze component parts during erection in manner which would damage finish, decrease strength, or result in visual imperfection or failure in performance. Return component parts which require alteration to shop for further fabrication, if possible, or for replacement with new parts.

H. Site Tolerances:

1. Variation from plane or location shown on shop drawings: 0.4 inches over 33-feet (10mm over 10m) length to maximum of 0.79 inches over 328 feet (20mm over 100m).
 2. Deviation of vertical and horizontal members: 0.12 inches over 28-feet (3mm maximum over 8.5m) run.
 3. Offset between two adjacent members abutted end-to-end, in line: maximum 0.03 inch (0.75mm) from true alignment.
- I. Touch-Up Painting: Inspect completed wall system and apply matching touch-up paint as needed to correct minor paint flaws.

3.4 FIELD QUALITY CONTROL

- A. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 CLEANING AND PROTECTION

- A. Remove and replace panels damaged beyond repair as direct result of panel installation.
- B. Repair panels with minor damage
- C. Remove protective film from finish panels within 60 days once installation is complete or as otherwise directed by the [Owner] [Owner's Representative] [Architect] [Consultant] [Engineer].
- D. Provide additional protection required after installation to protect assembly and finishes during construction.
- E. Weep holes and drainage channels shall be unobstructed and free of dirt and sealants.
- F. Upon final acceptance of installation, remove surplus and protective materials, excess materials, rubbish, tools and equipment from site.
- G. Leave panels clean and free of debris and residue. Where required, clean exposed panel surfaces using non-abrasive detergent and clean water in accordance with manufacturer's instructions.

END OF SECTION 074243

**SECTION 07531
EPDM MEMBRANE ROOFING & INSULATION**

PART 1 GENERAL

1.1 DESCRIPTION

- A. The project consists of installing Carlisle's Sure-Seal (black) FleeceBACK Adhered Roofing System in conjunction with Flexible FAST Adhesive as outlined below:

Apply the FleeceBACK Adhered Roofing System in conjunction with a 1/2" SecurShield HD Cover board, adhered over two layers of 2.6" Insulbase and Tapered Insulbase Insulation over the new Structural Concrete roof deck.

1.2 EXTENT OF WORK

- A. Provide all labor, material, tools, equipment, and supervision necessary to complete the installation of a Sure-Seal FleeceBACK Adhered Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details.
- B. The roofing contractor shall be fully knowledgeable of all requirements of the contract documents and shall make themselves aware of all job site conditions that will affect their work.
- C. The roofing contractor shall confirm all given information and advise the building owner, prior to bid, of any conflicts that will affect their cost proposal.
- D. Any contractor who intends to submit a bid using a roofing system other than the approved manufacturer must submit for pre-qualification in writing fourteen (14) days prior to the bid date. Any contractor who fails to submit all information as requested will be subject to rejection. Bids stating "as per plans and specs" will be unacceptable.

1.3 SUBMITTALS

- A. Prior to starting work, the roofing contractor must submit the following:
1. Shop drawings showing layout, details of construction and identification of materials.
 2. A sample of the manufacturer's Membrane System Warranty.

3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
 4. Certification of the manufacturer's warranty reserve.
- B. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the specifier prior to the issuance of the manufacturer's warranty.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.
- B. Comply with the manufacturer's written instructions for proper material storage.
1. Store FleeceBACK membrane in a dry area. Moisture absorbed by the fleece backing must be removed using a wet-vac system prior to membrane adhesive.
 2. Store other materials between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.
 3. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.
- C. Insulation must be on pallets, off the ground and tightly covered with waterproof materials.
- D. Any materials which are found to be damaged shall be removed and replaced at the applicator's expense.

1.5 WORK SEQUENCE

- A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath or wick into any completed sections of the membrane system.
- B. Do not disrupt activities in occupied spaces.

1.6 USE OF THE PREMISES

- A. Before beginning work, the roofing contractor must secure approval from the building owner's representative for the following:
 - 1. Areas permitted for personnel parking.
 - 2. Access to the site.
 - 3. Areas permitted for storage of materials and debris.
 - 4. Areas permitted for the location of cranes, hoists and chutes for loading and unloading materials to and from the roof.
- B. Interior stairs or elevators may not be used for removing debris or delivering materials, except as authorized by the building superintendent.

1.7 EXISTING CONDITIONS

If discrepancies are discovered between the existing conditions and those noted on the drawings, immediately notify the owner's representative by phone and solicit the manufacturer's approval prior to commencing with the work. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.8 PRECONSTRUCTION CONFERENCE

- A. A pre-bid meeting will be held at the job site at the Owner's discretion.
- B. Prior to bid submittal, the roofing contractor should schedule a job site inspection to observe actual conditions and verify all dimensions on the roof. The job site inspection may occur on the day of the pre-bid meeting or prior to such a meeting. Should access to the roof be necessary before or after the pre-bid meeting, the contractor must contact the Owner to coordinate an appropriate time.
- C. The Owner will advise on all Bid deadlines, meetings, etc.
- D. Any conditions which are not shown on the shop drawings should be indicated on a copy of the shop drawing and included with bid submittal if necessary to clarify any conditions not shown.

1.9 TEMPORARY FACILITIES AND CONTROLS

- A. Temporary Utilities:

1. Water, power for construction purposes and lighting are not available at the site and will not be made available to the roofing contractor.
2. Provide all hoses, valves and connections for water from a source designated by the owner when made available.
3. When available, electrical power should be extended as required from the source. Provide all trailers, connections and fused disconnects.

B. Temporary, Sanitary Facilities

Sanitary facilities will not be available at the job site. The roofing contractor shall be responsible for the provision and maintenance of portable toilets or their equal.

C. Building Site:

1. The roofing contractor shall use reasonable care and responsibility to protect the building and site against damages. The contractor shall be responsible for the correction of any damage incurred as a result of the performance of the contract.
2. The roofing contractor shall remove all debris from the job site in a timely and legally acceptable manner so as to not detract from the aesthetics or the functions of the building.

D. Security:

Obey the owner's requirements for personnel identification, inspection and other security measures.

1.10 JOB SITE PROTECTION

- A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application.
- B. During the roofing contractor's performance of the work, the building owner will continue to occupy the existing building. The contractor shall take precautions to prevent the spread of dust and debris, particularly where such material may sift into the building. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary, temporary enclosures to prevent dust or debris in the construction area(s)

from entering the remainder of the building.

- C. Do not overload any portion of the building, by either use of or placement of equipment, storage of debris, or storage of materials.
- D. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.
- E. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.
- F. Store moisture susceptible materials above ground and protect with waterproof coverings.
- G. Remove all traces of piled bulk material and return the job site to its original condition upon completion of the work.

1.11 SAFETY

The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. **Safety shall be the responsibility of the roofing contractor.** All related personnel shall be instructed daily to be mindful of the full time requirement to maintain a safe environment for the facility's occupants including staff, visitors, customers and the occurrence of the general public on or near the site.

1.12 WORKMANSHIP

- A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.
- B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.
- C. There shall be a supervisor on the job site at all times while work is in progress.

1.13 QUALITY ASSURANCE

- A. The Sure-Seal Membrane Roofing System must achieve a UL Class A.
- B. The membrane must be manufactured by the material supplier. Manufacturer's supplying membrane made by others are not acceptable.

- C. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.
- D. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing single-ply EPDM roofing systems and having installed at least three (3) roofing application or several similar systems of equal or greater size within one year.
- E. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and an experienced superintendent on the job at all times roofing work is in progress.
- F. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by written certification on manufacturer's letterhead and presented for the specifier's consideration.
- G. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.

1.14 JOB CONDITIONS, CAUTIONS AND WARNINGS

Refer to Carlisle's FleeceBACK Adhered Roofing System specification for General Job Site Considerations.

- A. Safety Data Sheets (SDS) must be on location at all times during the transportation, storage and application of materials.
- B. **Do not apply Flexible FAST Adhesive** when surface and/or ambient temperatures are **below 25°F**.
- C. The contractor must exercise caution during when spraying adhesive to avoid overspray.

Use a non-atomizing spray tip such as the Graco Spatter Tip and reduce spray pressure to 500 – 800 psi to increase adhesive droplet size and reduce airborne mist. Maintain hand held wind screens on-site for use as necessary. Extruding Flexible FAST Adhesive is also recommended for the elimination of overspray concerns.

- D. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.
- E. When loading materials onto the roof, the Carlisle Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.
- F. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.
- G. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.
- H. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.
- I. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
- J. New roofing shall be complete and weather tight at the end of the work day. Care must be taken to avoid wicking water through the fleece by properly sealing exposed edges of the membrane
- J. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.15 WARRANTY

- A. Provide manufacturer's 20 year Total System Warranty covering both labor and material with no dollar limitation. The maximum wind speed coverage shall be peak gusts of 90mph measured at 10 meters above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.
- B. Pro-rated System Warranties shall not be accepted.
- C. Evidence of the manufacturer's warranty reserve shall be included as part of the project submittals for the specifier's approval.

PART 2 PRODUCTS

2.1 GENERAL

- A. All components of the specified roofing system shall be products of Carlisle SynTec or accepted by Carlisle SynTec as compatible.
- B. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including adhesives, insulation, fasteners, fastening plates and edgings) must be **manufactured and supplied** by the roofing system manufacturer and covered by the warranty.

2.2 MEMBRANE

- A. Furnish Sure-Seal EPDM FleeceBACK 115-mil membrane. The membrane shall conform to the minimum physical properties of ASTM D4637-96, Type III (Fabric- backed membrane). Membrane sheets are 10' wide and 50' or 100' long and incorporate factory-applied splice tape (FAT) along the length of the membrane. Smaller 5' x 40' rolls are also available in the 100-mil and 115-mil thicknesses.
- B. Dynamic Puncture Resistance (ASTM D5635-04a) of 20 joules for 115-mil
- C. Static Puncture Resistance (ASTM D120) of 19 lbf for 115-mil

2.3 INSULATION/UNDERLAYMENT

- A. When applicable, insulation shall be installed in multiple layers and mechanically fastened or secured with Carlisle Flexible FAST Adhesive to the substrate in accordance with manufacturer's published specifications.
- B. Insulation shall be Insulbase Polyiso as supplied by Carlisle SynTec. Minimum R-value required is R-30
 - 1. **Carlisle Insulbase Polyisocyanurate** – A foam core insulation board covered on both sides with a medium weight fiber-reinforced felt facer meeting ASTM C 1289-06, Type II, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi). The product is available in 4' x 8' standard size with a thickness from 1 to 4 inches. 4' x 4' tapered panels are also available.
 - 2. **Carlisle SecurShield HD Cover Board**– a rigid insulation panel composed of a high-density, closed-cell polyisocyanurate foam core laminated to moisture resistant coated-glass fiber-mat facer for use as a cover board or recover board meeting ASTM 1289-06, Type II, Class 2 (109 psi max). Available 1/2" thick 4' x 8' panel weight 11 lbs with an R-value of 2.5.

2.4 FASTENING COMPONENTS

To be used for mechanical attachment of insulation and to provide additional membrane securement:

A. Fasteners, Plates and Bars

1. **HP- Fasteners:** a threaded, #14 fastener with a #3 phillips drive used with steel and wood roof decks.
2. **HP Term Bar Nail-Ins:** A 1-1/4" long expansion anchor with a zinc plated steel drive pin used for fastening the Carlisle Termination Bar or Seam Fastening Plates to concrete, brick, or block walls.
3. **Insulation Fastening Plates:** a nominal 3 inch diameter plastic or metal plate used for insulation attachment.

B. Insulation Adhesive:

1. **Flexible FAST Adhesive:** A two-component (Part A and B), low-rise polyurethane adhesive designed for bonding FleeceBACK membrane and/or insulation to various substrates. Flexible FAST Adhesive is packaged in 50- and 15-gallon drums, as well as, 5-gallon Jug, Dual Tanks and Dual Cartridges that can be applied in full spray or extrusion, depending on dispensing type. Dual Tank may also be used in a bead or splatter application.
 - a. Adhesive to provide 150% elongation in conjunction with fleece backed membrane – ASTM D412
 - b. MDI content of Part A material less than 25%

2.5 ADHESIVES, CLEANERS AND SEALANTS

1. **Flexible FAST Adhesive:** An elongating impact resistant two component insulating urethane adhesive used to attach insulation and FleeceBACK membrane. Packaging formats include 50 and 15 gallon drums as well as Dual Cartridges and 5 gallon Bag in a Box formats.
 1. Adhesive to provide 150% elongation in conjunction with fleece backed membrane – ASTM D412
 2. MDI content of Part A material less than 25%
3. **Carlisle Weathered Membrane Cleaner:** A clear, solvent-based cleaner used to loosen and remove dirt and other contaminants from the surface of exposed EPDM membrane (for repairs, etc.) prior to applying EPDM Primer. Weathered Membrane Cleaner can also be used when applying Splicing Cement. Available in 1 and 5-gallon pails.

4. **Sure-Seal SecurTAPE™:** A 3" or 6" wide (used for Mechanically Fastened Roofing Systems and 20-year Warranty Systems) by 100' long splice tape used for splicing adjoining sections of EPDM membrane. Complies with the South Coast Air Quality Management District Rule 1168.
5. **Low VOC EPDM Primer** - A low VOC (volatile organic compound) primer (less than 250 grams/liter) for use with SecurTape or Pressure-Sensitive products. Available in 1 gallon pails.
6. **Lap Sealant:** A black, heavy-bodied material used to seal the exposed edges of a membrane splice. A pre- formed Lap Sealant tool is included in each carton of Lap Sealant. Available in tubes.
 - a. Sure-Seal Lap Sealant: Black sealant for use with Sure-Seal (black) Roofing Systems.
7. **Water Cut-Off Mastic:** A one-component, low viscosity, self wetting, Butyl blend mastic used as a sealing agent between the EPDM membrane or Elastoform Flashing and applicable substrates. Available in tubes.
8. **One-Part Pourable Sealer:** Available in black or white, a one-component, moisture curing, elastomeric polyether sealant used for attaching lightning rod bases and ground cable clips to the membrane surface and as a sealant around hard-to-flash penetrations such as clusters of pipes.
9. **Universal Single-Ply Sealant** A one-part polyether, non-sagging sealant designed for sealing expansion joints, control joints and counterflashings. Available in white only.
10. **Carlisle CAV-GRIP III Low-VOC Aerosol Contact Adhesive/Primer:** a low-VOC, methylene chloride- free adhesive that can be used for a variety of applications including: bonding Sure-Weld membrane to various surfaces, enhancing the bond between Carlisle's VapAir Seal 725TR and various substrates, priming unexposed asphalt prior to applying Flexible FAST Adhesive and for adhering Sure-Seal/Sure-Weld/Sure- Flex FleeceBACK and Sure-Seal EPDM or Sure-Weld TPO membrane to vertical walls. Coverage rate is approximately 2,000-2,500 sq. ft. per #40 cylinder and 4,000-5,000 sq. ft. per #85 cylinder as a primer, in a single-sided application and 750 sq. ft. per #40 cylinder and 1,500 sq. ft. per #85 cylinder as an adhesive for vertical walls, in a double-sided application.

2.6 METAL EDGING AND MEMBRANE TERMINATIONS

1. **SecurEdge 2000:** a metal fascia system with an extruded aluminum anchor bar and 24 gauge galvanized steel fascia. Metal fascia color shall be as designated by the Owner's Representative. ANSI/SPRI ES-1 Certified. 2000 Fascia FM Approved 1-645. 2000 Extended Fascia FM Approved 1-270. 2000 Canted Fascia FM

Approved 1-270.

- F. **Drip Edge:** a metal fascia/edge system with a 22 or 24 gauge continuous anchor cleat and .032 inch thick aluminum or 24 gauge steel fascia. Metal fascia color shall be as designated by the Owner's Representative.
- G. **Termination Bar:** a 1" wide and .098" thick extruded aluminum bar pre-punched 6" on center; incorporates a sealant ledge to support Lap Sealant and provide increased stability for membrane terminations.

2.7 WALKWAYS

Protective surfacing for roof traffic shall be Sure-Seal P.S. Walkway Pads (30" x 30" molded black rubber with factory applied tape) adhered to the FleeceBACK membrane after priming with HP-250 or Low VOC EPDM Primer or concrete pavers loose laid over an approved slip sheet (pavers not recommended for slopes greater than 2" in 12").

PART 3 EXECUTION

3.1 GENERAL

- A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, job site considerations and weather restrictions.
- B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.2 INSULATION PLACEMENT

- A. Install insulation or membrane underlayment over the substrate with boards butted together. Fill joints or gaps greater than 1/4 inch with Flexible FAST Adhesive. Stagger joints both horizontally and vertically if multiple layers are provided.
- B. Secure insulation to the substrate with Flexible FAST Adhesive or mechanical fasteners in accordance with the manufacturer's specifications.

3.3 MEMBRANE PLACEMENT AND BONDING

- A. Position and unroll successive sheets and align to provide for a minimum 3 inch wide splice. At end laps (along the width of the sheet), membrane shall be butted together and overlaid with 6" wide Sure-Seal Pressure Sensitive Cured Cover Strip or Pressure Sensitive Overlayment Strip.
- B. FleeceBACK Membrane shall be fully adhered to an acceptable substrate with Carlisle Flexible FAST Adhesive. The adhesive is spray applied or

extruded to the substrate only and the membrane is rolled into the wet adhesive once it has foamed up and reached string/gel time (approximately 2 minutes). Roll the membrane with a 30" wide, 150 lb weighted segmented steel roller to set the membrane into the adhesive.

Note: Exercise care to prevent overspray onto the membrane. If Flexible FAST Adhesive should contaminate the splice area, immediately (while the adhesive is still in liquid form) clean with Weathered Membrane Cleaner or allow Flexible FAST Adhesive to cure and remove with a paint-type scraper.

- C. Install adjoining membrane sheets in the same manner, overlapping edges approximately 4 inches. Do not apply bonding adhesive to the splice area.

3.4 MEMBRANE SPLICING

A. **General**

The FleeceBACK membrane has selvage edges (the fleece-backing is discontinued) and factory-applied splice tape along the length of the sheet for membrane splicing. Selvage edges are not provided along the width of the membrane; adjoining membrane sheets are butted together and overlaid with 6" wide Pressure-Sensitive Cured Cover Strip or Pressure-Sensitive Overlayment Strip. As an option, sheets can be rotated 90 degrees to form a cap sheet to eliminate flashing overlay.

B. **Membrane Splicing with Factory-Applied Splice Tape**

1. Position membrane sheet to allow for required splice overlap. Mark the bottom sheets with an indelible marker approximately 1/4" to 1/2" from the top sheet edge. The pre-marked line on the membrane edge can also be used as a guide for positioning splice tape.
2. When the membrane is contaminated with dirt, fold the top sheet back and clean the dry splice area (minimum 3" wide) of both membrane sheets by scrubbing with clean natural fiber rags saturated with Sure-Seal Weathered Membrane Cleaner. When using Sure-Seal (black) PRE-KLEENED membrane, cleaning the splice area is not required unless contaminated with field dirt or other residue.
3. Apply Low VOC EPDM Primer to splice area and permit to flash off.
4. When adhering Factory Applied Tape (FAT), pull the poly backing from FAT beneath the top sheet and allow the top sheet to fall freely onto the exposed primed surface. Press top sheet on to the bottom sheet using firm even hand pressure across the splice towards the splice edge.
5. For end laps, apply 3" or 6" SecurTAPE to the primed membrane surface in accordance with the manufacturer's specifications. Remove the poly backing and roll the top sheet onto the mating surface.

6. Tape splices must be a minimum of 2-1/2" wide using 3" wide SecurTAPE extending 1/8" minimum to 1/2" maximum beyond the splice edge. Field splices at roof drains must be located outside the drain sump.

Note: For projects where a 90-mil membrane OR 20-year or longer System Warranty is specified, splice enhancements are required. Refer to Carlisle Sure-Seal/Sure-White Roofing System Specification.

7. Immediately roll the splice using positive pressure when using a 2" wide steel roller. Roll across the splice edge, not parallel to it. When FAT is used, Carlisle's Stand-Up Seam Roller can be used to roll parallel to the splice edge.
8. **At all field splice intersections**, apply Lap Sealant along the edge of the membrane splice to cover the exposed SecurTAPE 2" in each direction from the splice intersection. Install Carlisle's Pressure-Sensitive "T" Joint Covers or a 6" wide section (with rounded corners) of Sure-Seal Pressure-Sensitive Flashing over the field splice intersection.

3.5 FLASHING

- A. Wall and curb flashing shall be cured membrane. Continue the deck membrane as wall flashing where practicable.
- B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.6 WALKWAYS

- A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the specifier's drawing.
- B. Adhere walkways to the membrane in accordance with the manufacturer's specifications.

3.7 DAILY SEAL

- A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- B. Use Flexible FAST Adhesive or other similar material in accordance with the manufacturer's requirements.

3.8 CLEAN UP

- A. Perform daily clean up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
- B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION 07531



March 8, 2021

Attn: Ryan Doran
Coastal Specified Products
42-16 11th Street
Long Island City, New York 11101

**Re: 500 Commerce Street
Hawthorne, New York**

To Whom It May Concern:

This letter shall acknowledge that the following Carlisle roofing system is considered for warranty by Carlisle SynTec Systems. The following roof assembly as noted for a Carlisle SynTec System has an uplift rating of -315.0-PSF [ANSI/FM 4474].

Building Height: Maximum 45-feet tall
Slope: This assembly is UL Class A listed with a maximum slope restriction of 1/2" per foot [UL 790/ASTM E108].
Membrane: 115-mil Sure-Seal® EPDM FleeceBACK® membrane adhered with Flexible FAST™ Adhesive at 4" on center bead spacing in the field, perimeter and corners.
Cover Board: 1/2" SecurShield™ HD [4'x 4' boards] adhered with Flexible FAST™ Adhesive at 6" on center bead spacing in the field, perimeter and corners.
Insulation: Two [2] layers of 2.6-inch thick and Tapered 20-PSI InsulBase® Polyisocyanurate insulation [4'x 4' boards] adhered with Flexible FAST™ Adhesive at 6" on center bead spacing in the field, perimeter and corners.
Deck: New Structural Concrete deck

The roofing assembly described herein, represents Carlisle's minimum warranty requirements. It is not intended to modify, negate or alter any requirements dictated by the specifier or mandated by the building code or the building owner's insurer. Carlisle's review and inspection are strictly for the purpose of issuing the Carlisle warranty.

System enhancements pertaining, but not limited, to membrane thickness, insulation type and thickness, flashing height, slope requirements and membrane terminations (beyond those required by Carlisle) are to be complied with when specified unless approved by the Architect / Consultant. These conditions are considered above and beyond the scope of Carlisle review and take precedence.

Upon final inspection and acceptance by a Carlisle Field Service Representative confirming that the roof system has been installed in accordance with Carlisle Specifications, Carlisle will issue a 20-year warranty with 90-MPH wind speed coverage. Unless purchased or supplied through Carlisle, please note that performance, integrity, and impact of products by others is not included under coverage of the Carlisle Warranty.

If you have any question or need any additional information, feel free to contact our office.

Sincerely,

Kevin Ramberger
Design Analyst
Carlisle SynTec Systems

Cc: Glenn Szalay, Tracy DePuma

SECTION 07600
SHEET METAL FLASHINGS & ACCESSORIES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver, and install all work of this section as shown on the drawings, as specified herein, and/or as required by the job conditions.

1.2 DESCRIPTION OF WORK

- A. Roof related sheet metal work, including cap and through wall flashings, hook strips, drip edges, fascia, gravel stops, gutters, leaders, soffits and other miscellaneous flashings.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Masonry -Division 4
- B. Rough Carpentry -Division 6
- C. Performed Standing Seam Metal Roofing -Section 07410
- D. EPDM Membrane Roofing -Section 07531

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide primary products, including each type of flashing and accessory, produced by a single Manufacturer, which has produced that type product successfully for not less than 5 years. Provide secondary products only as recommended by the Manufacturer of the primary products.
- B. Installer Qualifications:
1. A firm (Installer) with not less than 5 years of successful experience installing sheet metal items similar to those required for this project, employing personnel skilled in the work specified.
 2. The Installer shall provide a list of at least five completed projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Owner.
 3. The Installer shall directly employ the personnel performing the work of this section.

- C. Installer's Field Supervision: Maintain a full time supervisor-foreman on the roof when sheet metal work is in progress. The supervisor shall have a minimum of 5 years experience in roof related sheet metal work, and speak fluent English.
- D. Attend the Pre-roofing conference and review methods and procedures related to sheet metal work, including but not limited to the following:
 - 1. How the application of sheet metal items will be coordinated with the installation of wood blocking, roofing & flashing materials, ice and water shield, insulation, underlayment, and other similar items to provide a watertight installation.
 - 2. Commercial practice and the Manufacturer's instructions for handling and installing his materials.
 - 3. The condition of sheet metal substrates, curbs, penetrations and other preparatory work, needed and/or performed by other trades.
 - 4. The schedule for mock-up construction and approval.
 - 5. The construction schedule: availability of sheet metal materials, personnel, equipment and facilities needed to make progress and avoid delays.
 - 6. Weather and forecasted weather conditions, and procedures for coping with unfavorable weather conditions.

1.5 SUBMITTALS

- A. Shop drawings which show each sheet metal item and how it relates to the wood blocking, roof membrane, stripping, and flashings.
- B. A 6 inch square piece of each type of sheet metal to show surface finish, texture and color.
- C. Technical literature for each type of sheet metal, adhesive, cement or other laminating medium.
- D. Samples of each type of fastener.
- E. Manufacturer's technical literature and shop drawings for preformed sheet metal items, which show how to install the item, form and seal joints.
- F. A sample of the Contractor's guarantee form.
- G. Material Safety Data Sheets.

1.6 JOB MOCK-UPS

- A. Prepare, in actual job locations, mock-ups of cap and through wall flashings, hook strips, drip edges, fascia, gravel stops, gutters, leaders, and all other items of sheet metal and related work, for the inspection and approval of the Architect.

- B. Construct each mock-up of two full lengths of metal, fully fastened, connected and stripped-in to the related roofing system, to show the following:
 - 1. Type, gauge, color, cross-sectional dimensions and shape, and joint and mitering techniques.
 - 2. Wood blocking, and attachment techniques and fasteners for all wood and metal components.
 - 3. Masonry configuration.
 - 4. Other sheet metal related materials and their installation techniques to fully define the detailing of each mock-up.
- C. The purpose of each mock-up is to establish minimum standards of materials and workmanship and to assure that completed installations based on the mock-ups will be fully functional and will serve the purpose for which they have been designed.
- D. Approved mock-ups may be left in place and incorporated into the permanent installation. Rejected mock-ups shall be removed and replaced until approved.
- E. Do not purchase or fabricate sheet metal items until mock-up erection, inspection and approval is completed and approval is documented in writing.

1.7 GUARANTEE

- A. Provide a Contractor's written Guarantee which warrants that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion.
 - 1. Defective work includes but is not limited to the following types of failure: leakage, delamination, lifting, loosening, splitting, cracking, and undue expansion.
- B. The Guarantee shall provide that in the event the work installed fails to so perform, the Contractor will make the repairs and modifications necessary to enable the work to perform as warranted, at his own expense.
- C. The Guarantee shall be issued no more than 30 days before the satisfactory completion of punch list work.
- D. The Guarantee shall include the removal and replacement of items or materials installed with sheet metal flashings and accessories as part of the original work, if removal is needed to effect guaranteed repairs.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lead-coated copper: copper sheet, coated on both sides, with a smooth uniform coating of lead, weighing approximately 6 to 7-1/2 pounds per side per 100 square feet, conforming with ASTM B101, Type 1, Class A, thickness 16 ounces per square foot, cold rolled temper.
- B. Use lead-coated copper for all metal items not otherwise indicated.
- C. Solder: 60-40 tin and lead for lead coated copper, conforming to FS #QQ-S-571, supplied in one pound bars with the alloy mixture stamped into the bar by the Manufacturer.
- D. Flux: self-neutralizing chloride based water-soluble liquid flux, Kester #1429 Water Soluble Organic Soldering Flux.
- E. Aluminum fascias, hook strips, gravel stops and miscellaneous trim: #3105-H14 alloy aluminum, minimum thickness .040 inches unless otherwise indicated, factory finished with a Fluoropolymer Kynar 500 finish, color as selected by the Architect.
- F. PVC coated metal: PVC coated, heat-weldable sheet metal consisting of 25 gauge G90 galvanized steel factory coated with 20 mils of PVC membrane on the finished side, color as selected.
- G. Soffit panels: .032 inches aluminum soffit panels 1 inch thick and 11 inches wide factory finished with a fluoro-polymer Kynar 500 Finish, color as selected, a manufactured by Peterson Aluminum Corporation under the trades name Flush Panel, or approved equal.
- H. Fasteners: stainless steel, or match the sheet metal being fastened.
- I. Exterior mounted gutters: .050 inch thick seamless aluminum gutters, fabricated from colored metal stock, prefinished to match the panel roofing and accessory trim, by Garrety Gutters phone 800/628-5849, mounted with concealed extruded aluminum fascia brackets, or brackets shop fabricated from 1-1/2 inch wide 1/8 inch thick aluminum stock, formed to hook onto the front edge of the gutter and be fastened through the back of the gutter with two screws in each bracket.
- J. Exterior mounted leaders: .027 inch thick rectangular corrugated aluminum leaders, fabricated from colored metal stock, prefinished to match the panel roofing and accessory trim, mounted with 1-1/2inch wide 1/16 inch thick wrap around prefinished straps.
- K. Sealant: high performance, low modulus, one-component, moisture curing modified polyurethane, which meets ASTM C-920 Type S Grade NS Class 25, equal to Sonneborne NP-1, color as selected by Architect.

- L. Ice and Water Shield: 30 mil thick slip resistant, butyl based adhesive coated membrane, intended for use in high temperature applications under sheet metal roofing, with a plastic release layer for peel and stick application directly to a prepared roof deck: W.R. Grace Vycor Ultra.

PART 3 - EXECUTION

3.1 GENERAL

- A. Accurately reproduce the detail and design shown, and form profiles, bends and intersections, sharp, true and even. Fabricate sheet metal in the shop whenever possible, and form joints, laps, splices and connections to shed water and condensation in the direction of flow.
- B. Provide miscellaneous flashing and sheet metal work not shown on the drawings but otherwise needed to leave the project complete and entirely watertight, neatly and carefully executed in a thorough and workmanlike manner.

3.2 INSPECTION

- A. Examine surfaces to receive work of this section and report to the Architect any defects affecting installation. Commencement of work will be construed as complete acceptance of surfaces.

3.3 INSTALLATION

- A. Fabricate and install copper work in accordance with "Copper and Common Sense" as published by the Revere Copper and Brass Company, unless otherwise indicated.
- B. Form all joints, except loose locked sealant filled expansion joints, 3/4 inch wide, flat locked and soldered or overlapped 2 inches, riveted 1 inch on-center, and soldered. Use solder only to fill and seal the joint, not for mechanical strength. Form soldered joints continuous, strong and free from defects, with well heated soldering irons. Do not use open flame torches for soldering.
- C. Clean soldered joints daily, immediately upon the completion of soldering, by washing with an acid-neutralizing soap and water solution, applied with a soft bristle brush, then rinsing with clear water.
- D. Securely fasten and anchor all work, and make provisions for thermal expansion. Submit details of expansion joints for approval. Install fasteners through one edge of metal only.
- E. Use stainless steel pin Zamac type nail-in fasteners, where fasteners will be exposed.

3.4 CAP FLASHINGS

- A. Fabricate new cap flashing built into masonry walls from 16 ounce lead-coated copper, properly joined to all related materials in a watertight manner. Form all seams in the new cap flashing, except sealant filled expansion seams, to overlap approximately 2 inches, secure the seams with rivets spaced 1 inch on center, and sweat solder them.
- B. Form 2 inch wide flat locked sealant filled expansion seams 32 feet on center.
- C. Install new cap flashings where shown on the drawings, and above all coping and gravel stop terminations, at a minimum height of 10 inches above the membrane.
- D. Form new cap flashing built into masonry to turn up 2 inches minimum inside the wall, and finish with a hem on the bottom exposed edge.
- E. Lap new cap flashing under fabric type wall flashing.
- F. Fabricate new cap flashing equipment curbs from .040 inch thick aluminum, to extend 2 inches under the equipment, 4 inches over the base flashing, and finish with a 1/2 inch hem on the bottom edge. Install a 1/2 inch thick by 2 inch wide continuous foam gasket between the cap flashing and mechanical equipment. Do not set the units in sealant. Secure the equipment to its curb with stainless steel screws spaced 12 inches on center.

3.5 THROUGH WALL FLASHINGS

- A. Fabricate new through wall flashings from 16 ounce lead coated copper to extend the entire width of the masonry wall, turn down 3/4 inch on the exterior and 4 inches with a 1/2 inch hem on the interior.
- B. Set through wall flashings on a skim coat of mortar used to level the wall.
- C. Form all seams, except sealant filled expansion seams, in the through wall flashing to overlap 2 inches. Secure the seams with rivets spaced 1 inch apart and sweat solder the joint.
- D. Form 2 inch wide flat locked sealant filled expansion seams 32 feet on center.
- E. Install stainless steel dowels through the new through wall flashings, tightly driven into drilled holes in the underlying masonry, positioned so that each piece of superimposed masonry will be secured with a minimum of two dowels.
- F. Pre-tin the dowels, and solder the dowels to the through wall flashing to form a watertight seal.

3.6 DRIP EDGES

- A. Fabricate drip edges from PVC coated metal to extend 1-1/2 inches past the roof edge. Secure the drip edge with a continuous hook strip along the bottom edge

and roofing nails along the top edge, spaced 4 inches apart positioned to be covered by the ice shield. Form joints in the drip edge with concealed under plates which duplicate the profile of the drip edge.

3.7 HOOK STRIPS

- A. Form continuous hook strips from .040 inch thick aluminum to engage the superimposed trim piece a minimum of 3/4 inch, and cover the entire underside of the edge of the wood blocking and neatly extend to the building wall.
- B. Fasten hook strips along their bottom edge, just above the 45 degree bend, with nails spaced 4 inches on center into underlying wood blocking; Zamac type nail-in type fasteners spaced 8 inches on center into masonry surfaces, or screws into sheet metal surfaces spaced 8 inches on-center.

3.8 FASCIA

- A. Fabricate new fascia from .050 inch thick aluminum. Secure the fascia with a continuous hook strip along the bottom edge and roofing nails along the top edge spaced 8 inches apart, positioned to be covered by the gravel stop. Form joints in the fascia with 5 inch wide concealed under plates.

3.9 GRAVEL STOPS

- A. Fabricate new gravel stops from PVC coated metal, with 4 inch wide nailing flanges. Secure the gravel stop with a continuous hook strip and by nailing the flange 4 inches apart along the raw edge with roofing nails. Form joints in the gravel stop with a 5 inch wide under plate set in a full bed of sealant. Form the gravel stop to turn up 6 inches at rising walls, extend the stripping up the wall and terminate it under a cap flashing.

3.10 CHIMNEY CAPS

- A. Fabricate new chimney caps from 16 ounce lead coated copper to cover the entire top of the chimney, overlap the exterior bed joint a minimum of 2 inches, and extend up and over the flue, turning down inside it, or past the inside bed joint 4 inches if there is no clay flue liner. Cover all flue separating masonry. Fasten the chimney cap with a hook strip under the outside edge and Zamac type fasteners spaced 12 inches apart along the inside edge if there is no clay flue liner.

3.11 CLEANING

- A. Clean all metal of any stains or blemishes; touch up and clean prefinished material after roofing is complete. Leave all surfaces clean and satisfactory to the Owner.

3.12 PROTECTION AND WATERTIGHTNESS

- A. Provide the equipment, materials and labor necessary to adequately protect the contract area, the building and its contents and occupants, and surrounding

landscaped and paved areas from damage due to the construction work or from inclement weather during construction.

- B. Do not perform work during inclement weather. Provide temporary covers, and make work areas and the building watertight at the end of each day's work.
- C. Clean up frequently all refuse, rubbish, scrap materials and debris so that at all times the work site shall present a neat, orderly and workmanlike appearance.

END OF SECTION 07600

PRODUCT DESCRIPTION

CAFCO 300 / ISOLATEK Type 300 is a durable, gypsum based, wet mix, commercial density Spray-Applied Fire Resistive Material (SFRM) designed to provide fire protection to concealed floor and roof assemblies, steel beams, columns, joists and concrete assemblies in building construction projects.

In addition to fire resistance, CAFCO 300 / ISOLATEK Type 300 also provides thermal benefits. As a thermal insulator, it is effective in reducing heat loss, particularly when applied to the underside of a roof deck. The R-value added by CAFCO 300 / ISOLATEK Type 300 may also allow a reduction in roof insulation.

CAFCO 300 / ISOLATEK Type 300 is very cost effective; requiring less material to achieve required fire ratings and offers the best fire resistance performance per unit thickness in its class.

PRODUCT ADVANTAGES

- Best fire ratings-minimal thickness
- Lightweight gypsum based material is easy to apply
- Provides additional value as a thermal insulator

FIRE TEST PERFORMANCE

CAFCO 300 / ISOLATEK Type 300 has been extensively tested for fire resistance and is rated for up to 4 hours for floor assemblies, beams, joists, columns, and roof assemblies.

- Classified by UL in accordance with ANSI/UL 263 (ASTM E119)
- Classified by UL in accordance with CAN/ULC-S101 (ASTM E119)
- Tested in accordance with BS 476 Parts 20 & 21 (Assessed in accordance with 5th Edition ASFP Yellow Book)
- Tested in accordance with EN13381 Parts 1, 3, 4 & 5
- Assessed in accordance with AS1530.4 : 2014 / AS4100 : 1998 (R2016) Amendment 1

CAFCO 300 has also been tested for surface burning characteristics in accordance with ASTM E84 and is rated Class A.

Flame Spread0 Smoke Developed0

CODE COMPLIANCES

CAFCO 300 / ISOLATEK Type 300 satisfies the requirements of the following:

- IBC® - INTERNATIONAL BUILDING CODE®
- City of Los Angeles (LADBS, Category 1 Material)
- NBC - National Building Code of Canada
- ICC-ES, AC23 and AC10 Requirements (UL ER13348-01)

MAJOR SPECIFICATIONS

CAFCO 300 / ISOLATEK Type 300 complies with the requirements of the following specifications:

- MasterSpec®, Section 078100 - APPLIED FIREPROOFING (AIA)
- MasterFormat® 2014, Section 07 81 00 Applied Fireproofing (CSC,CSI)
- United Facilities Guide Specification, UFGS 07 81 00 Spray-Applied Fireproofing (USACE, NAVFAC, AFCEC, NASA)
- Master Construction Specifications, Number 07 81 00 Applied Fireproofing (VA)
- Code of Federal Regulations, Title 40: Protection of the Environment (EPA)
- PBS-P100 Facilities Standards for the Public Buildings Services (GSA)
- Factory Mutual Approved

Thermal Performance

Product	Conductivity(k)*	Resistance (R/inch)
CAFCO 300 ISOLATEK Type 300	0.54 BTU in/hr ft ² F @ 75°F (0.078 W/m·K @ 24°C)	1.85

*When tested in accordance with ASTM C518

Physical Performance

Characteristic	ASTM Method	Industry Standard Performance*	Laboratory Tested Performance**
Density	E605	15 pcf (240 kg/m ³)	15 pcf (240 kg/m ³)
Combustibility	E136	Noncombustible	Noncombustible
Cone Calorimeter	E1354	No Flaming or Heat Release	No Flaming or Heat Release
Cohesion/Adhesion	E736	150 psf (7.2 kPa)	406 psf (19.4 kPa)
Deflection	E759	No Cracks or Delaminations	No Cracks or Delaminations
Bond Impact	E760	No Cracks or Delaminations	No Cracks or Delaminations
Compressive Strength	E761	1,440 psf (68.9 kPa)	3,311 psf (158.5 kPa)
Air Erosion Resistance	E859	Less than 0.025 g/ft ² (0.27 g/m ²)	0.000 g/ft ² (0.000 g/m ²)
Corrosion Resistance	E937	Does Not Promote Corrosion of Steel	Does Not Promote Corrosion of Steel
Sound Absorption	C423		0.50 NRC 1" (25 mm) on deck and beam
Fungal Resistance	G21	No Growth After 28 Days	Passed

* Standard performance based on MasterSpec®, Section 078100 APPLIED FIREPROOFING. Refer to UL design for density requirement.

** Values represent independent laboratory tests under controlled conditions.



Brand



CAFCO 300 / ISOLATEK Type 300 Guide Specification

SECTION 078100 - APPLIED FIREPROOFING

The following is an outline/short language specification. Complete specifications for Spray-Applied Fire Resistive Materials are available on various media upon request.

PART 1 - GENERAL

1.1 Work included

- 1.1.1 Provide all labor, materials, equipment and services necessary for, and incidental to, the complete and proper installation of all sprayed fire protection and related work as shown on the drawings or where specified herein, and in accordance with all applicable requirements of the Contract Documents.
- 1.1.2 The material and installation shall conform to the applicable building code requirements of all authorities having jurisdiction.

1.2 Quality Assurance

- 1.2.1 Work shall be performed by a firm with expertise in the installation of fire protection or similar materials. This firm shall be recognized or otherwise approved by the spray-applied fire resistive material manufacturer.
- 1.2.2 Before proceeding with the fire protection work, approval of the proposed material thicknesses and densities shall be obtained from the architect and other applicable authorities having jurisdiction.

1.3 Related Sections

- 1.3.1 SECTION 051200 - STRUCTURAL STEEL FRAMING
- 1.3.2 SECTION 053100 - STEEL DECKING
- 1.3.3 SECTION 072100 - THERMAL INSULATION
- 1.3.4 SECTION 078123 - INTUMESCENT FIREPROOFING
- 1.3.5 SECTION 078443 - JOINT FIRESTOPPING

1.4 References

- A. ASTM E84 - Surface Burning Characteristics of Building Materials.
- B. ASTM E119 - Fire Tests of Building Construction and Materials.
- C. ASTM E605 - Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.
- D. ASTM E736 - Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- E. ASTM E759 - Effect of Deflection of Sprayed Fire-Resistive Materials Applied to Structural Members.
- F. ASTM E760 - Effect of Impact on Bonding of Sprayed Fire-Resistive Materials Applied to Structural Members.
- G. ASTM E761 - Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.
- H. ASTM E859 - Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- I. ASTM E937 - Corrosion of Steel by Sprayed Fire-Resistive Materials Applied to Structural Members.
- J. CAN / ULC-S101 - Standard Methods of Fire Tests of Building Construction and Materials.
- 1.4.1 Underwriters Laboratories (UL) Fire Resistance Directory.
- 1.4.2 Underwriters Laboratories of Canada (ULC) List of Equipment and Materials.
- 1.4.3 IBC® INTERNATIONAL BUILDING CODE® CHAPTER 17 STRUCTURAL TESTS AND SPECIAL INSPECTIONS, Section 1705 Special Inspections.

1.4.4 AWCI Publication: Technical Manual 12-A Standard Practice for the Testing and Inspection of Field-Applied Sprayed Fire Resistive Materials; an Annotated Guide.

1.5 Submittals

- 1.5.1 Manufacturer's Data: Submit Manufacturer's specification, including certification as may be required to show material compliance with Contract Documents.
- 1.5.2 Test Data: Independent laboratory test results shall be submitted for all specified performance criteria.

1.6 Delivery, Storage and Handling

- 1.6.1 Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data. Packaging shall bear the UL labels for fire hazard and fire-resistance classifications.
- 1.6.2 Store materials above ground, in a dry location, protected from the weather. Damaged packages found unsuitable for use must not be used.

1.7 Project Conditions

- 1.7.1 When the prevailing outdoor temperature at the building is less than 40° F (4°C), a minimum substrate and ambient temperature of 40° F (4°C) shall be maintained prior to, during, and a minimum of 24 hours after application of spray-applied fire resistive material. If necessary for job progress, General Contractor shall provide enclosures and heat to maintain proper temperatures and humidity levels.
- 1.7.2 General Contractor must provide adequate ventilation to allow proper drying of the sprayed fire protection during and subsequent to its application.
- 1.7.2.1 Ventilation must not be less than 4 complete air exchanges per hour until the material is dry. When spraying in enclosed areas such as basements, stairwells, shafts, and small rooms, additional air exchanges may be necessary.

1.8 Sequencing/Scheduling

- 1.8.1 All fire protection work on a floor shall be completed before proceeding to the next floor.
- 1.8.2 The Contractor shall cooperate in the coordination and scheduling of fire protection work to avoid delays in job progress.

PART 2 - PRODUCTS

2.1 Acceptable Manufacturers

- 2.1.1 The spray-applied fire resistive material shall be manufactured under the CAFCO® / ISOLATEK brand name, by authorized producers.

2.2 Materials

- 2.2.1 Materials shall be CAFCO 300, (UL/ULC designation: ISOLATEK Type 300) applied to conform to the drawings, specifications and following test criteria:
- 2.2.1.1 Deflection: When tested in accordance with ASTM E759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one time vertical centerload resulting in a downward deflection of 1/120th of the span.
- 2.2.1.2 Bond Impact: When tested in accordance with ASTM E760, the material shall not crack or delaminate from the concrete topped galvanized deck to which it is applied.

2.2.1.3 Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have a minimum bond strength of 150 psf (7.2 kPa).

2.2.1.4 Air Erosion: When tested in accordance with ASTM E859, the material shall not be subject to losses from the finished application greater than 0.025 grams per sq. ft. (0.27 grams per square meter).

2.2.1.5 Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 1,440 psf (68.9 kPa).

2.2.1.6 Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.

2.2.1.7 Surface Burning Characteristics: When tested in accordance with ASTM E84, the material shall exhibit the following surface burning characteristics:
Flame Spread 0
Smoke Developed 0

2.2.1.8 Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL / ULC design or as required by the authority having jurisdiction.

2.2.2 The material shall have been tested and classified by Underwriters Laboratories (UL) or Underwriters Laboratories of Canada (ULC) in accordance with the procedures of UL 263 (ASTM E119) or CAN/ULC-S101.

2.2.3 Spray-applied fire resistive materials shall be applied at the appropriate minimum thickness and density to achieve the following ratings:
Floor assemblies ____hr.
Roof assemblies ____hr.
Beams ____hr.
Girders ____hr.
Columns ____hr.
Joists ____hr.

2.2.4 Potable water shall be used for the application of spray-applied fire resistive materials.

2.2.5 Spray-applied fire resistive materials shall contain no detectable asbestos. Material manufacturer shall provide certification of such upon request.

PART 3 - EXECUTION

3.1 Preparation

- 3.1.1 All surfaces to receive spray-applied fire resistive material shall be free of oil, grease, loose mill scale, dirt, paints/primer or other foreign materials which would impair satisfactory bonding to the surface. Manufacturer shall be contacted for procedures on handling primed/painted steel. Any cleaning of surfaces to receive sprayed fire protection shall be the responsibility of the General Contractor or Steel Erector, as outlined in the structural steel or steel deck section.
- 3.1.2 Clips, hangers, supports, sleeves and other attachments to the substrate are to be placed by others prior to the application of spray-applied fire resistive materials.
- 3.1.3 The installation of ducts, piping, conduit or other suspended equipment shall not take place until the application of spray-applied fire resistive materials is complete in an area.
- 3.1.4 The spray-applied fire resistive material shall only be applied to steel deck which has been fabricated and erected in accordance with the criteria set by the Steel Deck Institute.

3.1.5 When roof traffic is anticipated, as in the case of periodic maintenance, roofing pavers shall be installed as a walkway to distribute loads.

3.2 Application

- 3.2.1 Equipment, mixing and application shall be in accordance with the manufacturer's written application instructions.
- 3.2.2 The application of spray-applied fire resistive material shall not commence until certification has been received by the General Contractor that surfaces to receive sprayed fire protection have been inspected by the applicator and are acceptable to receive spray-applied fire resistive material.
- 3.2.3 All unsuitable substrates must be identified by the installer and made known to the General Contractor and corrected prior to application of the spray-applied fire resistive material.
- 3.2.4 Spray-applied fire resistive material shall not be applied to steel floor decks prior to the completion of concrete work on that deck.
- 3.2.5 The application of spray-applied fire resistive material to the underside of roof deck shall not commence until the roofing is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and after construction roof traffic has ceased.
- 3.2.6 Proper temperature and ventilation shall be maintained as specified in 1.7.1, 1.7.2 and 1.7.2.1.
- 3.2.7 Provide masking, drop cloths or other suitable coverings to prevent overspray from coming in contact with surfaces not intended to be sprayed.
- 3.2.8 CAFCO BOND-SEAL (ISOLATEK Type EBS) adhesive shall be applied as per the appropriate UL/ULC fire resistance design and manufacturer's written recommendations.

3.3 Repairing and Cleaning

- 3.3.1 All patching of and repair of damaged spray-applied fire resistive material shall be performed under this section and paid for by the trade responsible for the damage.
- 3.3.2 After the completion of the work in this section, equipment shall be removed and all surfaces not to be sprayed shall be cleaned to the extent previously agreed to by the applicator and General Contractor.

3.4 Inspection and Testing

- 3.4.1 The spray-applied fire resistive material shall be tested for thickness and density in accordance with one of the following procedures:
ASTM E605 - Standard Test Method of Sprayed Fire-Resistive Materials Applied to Structural Members.
AWCI Publication: Technical Manual 12-A Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials; an Annotated Guide.
IBC® INTERNATIONAL BUILDING CODE® CHAPTER 17 STRUCTURAL TESTS AND SPECIAL INSPECTIONS, Section 1705 Special Inspections.

Product Availability

Isolatek International Spray-Applied Fire Resistive Materials are available to trained, recognized applicators around the world from strategically located production and distribution points in the U.S., Canada, Mexico, Europe and the Pacific Basin.



ISOLATEK INTERNATIONAL is registered with the
AIA Continuing Education System (AIA/CES)



We support our customers with unsurpassed technical expertise and customer service, complemented by an extensive global network of experienced sales representatives and recognized applicators. For detailed product information or for the name of the sales representative in your area please contact us.

The performance data herein reflect our expectations based on tests conducted in accordance with recognized standard methods under controlled conditions. The applicator, general contractor, property owner and/or user MUST read, understand and follow the directions, specifications and/or recommendations set forth in Isolatek International's publications concerning use and application of these products, and should not rely merely on the information contained in this Technical Data Sheet. Isolatek International is not responsible for property damage, bodily injuries, consequential damages, or losses of any kind that arise from or are related to the applicator's general contractor's, or property owner's failure to follow the recommendations set forth in Isolatek International's publications. The sale of these products shall be subject to the Terms and Conditions set forth in the Company's invoices.



Isolatek International provides passive fireproofing materials under the CAFCO® and FENDOLITE® trademarks throughout the Americas and under the ISOLATEK® trademark throughout the world.

800.631.9600 or 973.347.1200

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SHORT FORM APPLICATION GUIDE
CAFCO® 300 & 300 SB
(Americas)
ISOLATEK® Type 300 & 300 SB
(Worldwide)

This is an abbreviated guide and is not intended as a substitute for the Long Form CAFCO 300 Series / ISOLATEK Type 300 Series Application & Installation Manual. Applicator shall completely and fully read and understand the Long Form Application & Installation Manual prior to applying this product.

PUMP REQUIREMENTS:

Mechanical Piston, Hydraulic Piston or Rotor Stator type, open throat, screw feed pump with minimum "No. 4" soft rubber stators must be used.

MIXER REQUIREMENTS:

Paddle or ribbon-type mortar mixer with safety cover and provision for quick dumping of mix directly into the pump hopper. Mixers capable of operating speeds of 35 to 40 RPM, are required. *Note: Continuous mixers may be used but a decrease in yield may occur. Mixers operating at less than required operating speeds may result in short "pot life".*

WATER REQUIREMENTS:

One bag of product requires 10.0 to 11.5 US Gallons (38 to 44 L) of potable water per bag. **A calibrated water meter is required** to ensure constant water volume per mix. *Note: The "five gallon bucket" method is unacceptable.*

MIX TIME:

Product is mixed by first adding potable water to the mixer and then product. Mix for two (2) minutes to achieve the target mixer slurry density. **In a multiple bag mix, the mix time begins after the last bag has been added to the mixer. Do not mix more material than can be used in 30 minutes.**

HOSE SET-UP:

High pressure plaster type hose. Typical Inner diameters (ID) and lengths are listed below.

<u>Total Hose Length</u>	<u>Diameter (ID)</u>	<u>Max. Length</u>
367 feet (112 m)	3 in (76 mm)	@ 50 ft (15 m)
	2 in (51 mm)	@ 200 ft (61 m)
	1-1/2 in (38 mm)	@ 50 ft (15 m)
	1-1/4 in (32 mm)	@ 25 ft (8 m)
	1 in (25 mm)	@ 25 ft (8 m)
	3/4 in (19 mm)	@ 17 ft (5 m)

Note: Using more than 17 ft. (5 m) of 3/4 in. (19 mm) I.D. whip hose can cause excessive back pressure on pump.

Flexible hose length shall not exceed 367 ft. (112 m). Hose couplings shall be pressure rated victaulic screw-on type that does not restrict product flow. Steel tapered reducers must be used when a reduction in hose is necessary. Brass or aluminum couplings or reducers must not be used.

Metal standpipe 2 in. (51 mm) to 3 in. (76 mm) I.D. must be used when pumping height exceeds 5 stories or 60 ft. (18 m) or when total length (horizontal plus vertical) of material hose exceeds 367 ft. (112 m). Aluminum standpipe must not be used.

NOZZLE REQUIREMENTS:

The spray nozzle assembly must consist of a min. 3/4 in. (19 mm) I.D. aluminum pole with a blow-off type nozzle cap. Nozzle orifice shall be nominal 5/8 in. (16 mm) I.D. **Note: A 5/8 in. (16 mm) I.D. orifice with the minimum amount of air needed for spraying is required for optimum coverage/density.**

INTRODUCTION OF QWIK-SET:

ISOLATEK® QWIK-SET is typically introduced in-line. When using a 1 in. (25 mm) material hose, the QWIK-SET should be introduced max. 25 ft. (8 m) back from the nozzle; when using a 3/4 in. (19 mm) material hose, the QWIK-SET should be introduced max. 17 ft. (5 m) back from the nozzle. As an alternative, QWIK-SET can be introduced at the nozzle. Refer to ISOLATEK QWIK-SET Short Form Application Guide for further information.

NOZZLE DISTANCE:

The distance between the nozzle and substrate will vary according to the type of equipment and nozzle used but must be between 12 in. (305 mm) and 24 in. (610 mm).

NOZZLE AIR PRESSURE:

Use the amount of air at the nozzle that results in an even thickness build, texture and proper density. Excessive air will decrease yield. Air pressure should make a dull buzzing noise rather than a high pitched sound.

THICKNESS PER PASS:

Apply 1/2 in. (13 mm) to 5/8 in. (16 mm) on the first pass, 3/4 in. (19 mm) to 1 in. (25 mm) on subsequent passes. **Note: Do not apply more than 1-1/4 in. (32 mm) of product in a 24 hour period. These are final expanded (accelerated) thicknesses.**

APPLICATION TEMPERATURE:

A minimum substrate and ambient temperature of 40°F (4°C) shall be maintained prior to, during and a minimum of 24 hours after the application.

SURFACE PREPARATION:

Ensure surfaces are clean and free of dirt, oil, grease, loose mill scale, paints/primers (other than those approved by Isolatek) and any other materials that may impair adhesion. For applications to

primed steel, contact Isolatak Technical Services Department. **Note: Some substrates require the use of CAFCO® BOND-SEAL (adhesive) / ISOLATEK® Type EBS, CAFCO® PRE-COAT / ISOLATEK® Type PC, or metal lath. Refer to the CAFCO 300 / ISOLATEK Type 300 Long Form Application Manual for specific requirements.**

SET-TIME:

Unaccelerated CAFCO 300 / ISOLATEK Type 300 sets in approximately 4 to 7 hours. For a faster set-time, use ISOLATEK QWIK-SET. Accelerated CAFCO 300 / ISOLATEK Type 300 will set in approximately 10 – 20 minutes depending on temperature and humidity conditions. Do not re-temper the product after it sets. See ISOLATEK QWIK-SET Short Form Application Guide for further information.

VENTILATION:

Provide a minimum of 4 complete air exchanges per hour until the material is dry.

SAFETY PRECAUTIONS:

CAFCO 300 / ISOLATEK Type 300 is slippery when mixed with water. Do not allow wet material to remain on scaffolds, ladder rungs or floors. Walking on wet material may result in slips or falls. Signage must be posted in areas where the spray application of CAFCO 300 / ISOLATEK Type 300 is ongoing to warn other trades of slip hazards.

CALCULATING MIXER DENSITIES:

1. Weigh an empty 1036 cc cup and tare the scale to account for the cup weight.
2. Fill the cup with material from the pump hopper. Then gently tap the cup on a hard surface to eliminate all air pockets.
3. Level the material with top of cup.
4. Weigh the filled cup in grams.
5. Compare weight in grams to the mixer density in chart below.

ESTIMATING CAFCO 300 / ISOLATEK Type 300 MIXER DENSITY FROM WET CUP WEIGHTS

WET CUP WEIGHT (Grams)	MIXER DENSITY Using 11.0 US Gals (44 L) Water	
	PCF	(kg/m ³)
717	43	(689)
733	44	(705)
750	45	(721)
767	46	(737)
783	47	(753)
799	48	(769)

Cup Size = 1036 cc

CALCULATING NOZZLE DENSITIES:

(Estimating Yield/Bag from Nozzle Wet Cup Weights)

1. Weigh an empty 1036 cc cup and tare the scale to account for the cup weight.
2. While the pump and atomizing air are running, place the nozzle inside cup and slowly pull back as the cup fills.
3. Level CAFCO 300 / ISOLATEK Type 300 with the top of cup, being careful not to compress the CAFCO 300 / ISOLATEK Type 300. Leveling should be repeated until the material stops swelling in cup. When leveling the CAFCO 300 / ISOLATEK Type 300, angle the spatula so that it is cutting the excess material as opposed to troweling/compressing it.
4. Weigh the filled cup in grams.
5. Using the chart below, determine the corresponding density and yield based on the water usage rate and the weight of the cup.
6. Adjust the QWIK-SET flow rate and repeat the steps above until the desired density and yield are achieved.

10.0 gal (38 L)/bag Nozzle Cup weight in grams (Net mat'l wt)	10.5 gal (40 L)/bag Nozzle Cup weight in grams (Net mat'l wt)	11.0 gal (42 L)/bag Nozzle Cup weight in grams (Net mat'l wt)	11.5 gal (44 L)/bag Nozzle Cup weight in grams (Net mat'l wt)	DRY DENSITY (Estimated) PCF (kg/m ³)	YIELD Est. Gross Yield/Bag Bd. ft. (m ² @1 mm)
686	707	728	749	17.5 (280)	39 (93)
666	687	707	728	17 (272)	40 (95)
627	646	666	685	16 (256)	43 (101)
588	606	624	642	15 (240)	46 (108)

Note: If you are having difficulty achieving these nozzle cup weights, please contact the Isolatak International Technical Service Department for assistance.

* Nozzle weights are based on a cup with a volume of 1036cc.

Note: UL minimum average density for CAFCO 300 / ISOLATEK Type 300 is 15 pcf (240 kg/m³) and the minimum individual density is 14 pcf (224 kg/m³). When applying CAFCO 300 to cellular deck a minimum average density of 17.5 pcf (280 kg/m³) and a minimum individual density of 16.0 pcf (256 kg/m³) must be maintained. **Warning: Exceeding 46 bd.ft./bag (109 m²@1mm) will result in densities below 15 pcf (240 kg/m³)**

NOTE: Only the listed equipment, nozzles and procedures are approved for applying CAFCO 300 / ISOLATEK Type 300. Deviations from these requirements will result in product not meeting claims as published in the literature. **For additional information, please contact the Technical Service Department.**



Isolatak International provides passive fireproofing materials under the CAFCO® and FENDOLITE® trademarks throughout the Americas and under the ISOLATEK® trademark throughout the world.

800.631.9600 or 973.347.1200
www.isolatek.com | technical@isolatek.com
technical-international@isolatek.com



CERTIFICATE OF COMPLIANCE

Certificate Number 20190507-R13348
Report Reference R13348
Issue Date 2019-May-07

Issued to: Isolatek International
41 FURNACE ST
STANHOPE, NJ 07874-2624 USA

**This certificate confirms that
representative samples of**

Spray-applied Fire-resistive Materials
Types CP-2, P-20, PC, DC/F, II, II HS, 280, 304, 404, HP,
300, SB, 300AC, 300ES, 300HS, 300N, 3000, 3000ES,
400AC, 400ES, 400, 800, M-II, M-II/P and TG

Have been investigated by UL in accordance with the
Standard(s) indicated on this Certificate.

Standard(s) for Safety: ANSI/UL 263, "Fire Tests of Building Construction and
Materials,"
ANSI/UL 1709, "Rapid Rise Fire Tests of Protection
Materials for Structural Steel."

Additional Information: See the UL Online Certifications Directory at
<https://iq.ulprospector.com> for additional information.

This *Certificate of Compliance* does not provide authorization to apply the UL Mark. Only the UL Follow-Up
Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's
Follow-Up Services.

Look for the UL Certification Mark on the product.

See addendum page 2-5



Bruce Mahrenholz, Director North American Certification Program
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This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Types DC/F, HP, II or II HS Spray-Applied Fire Resistive Materials investigated for exterior use in:

Floor-Ceiling Design Nos. A811, A815, D814, D816, D822, D824, D825, D826, D827, D829, D830, D831, D832, D833, D835, D836, D837, D840, D846, D847, D858, D859, D860, D861, D862, D865, D867, D868, D871, D902, D904, D908, D913, D914, D919, D921, D924, D926, D942, D947, D974, D977, D984, D988, D991, E701, E702, E706, G801, G802, G805, G809, J801, J803, J804, J805, J809, J957 and

Roof-Ceiling Design Nos. P301, P801, P807, P810, P811, P812, P815, P819, P822, P825, P826, P901, P902, P907, P908, P920, P922, P923 and

Beam Design Nos. N803, N804, N805, N814, N815, N816, N820, N823, N824, N825, N826, N830, N860, N868, N869, S801, S802, S803, S805, S806, S812 and

Wall Design Nos. U357, U401, U431, U450, U804 and

Column Design Nos. X525, X827, X829, X835, X840, X841.

Types CP-2, P-20 Spray-Applied Fire Resistive Materials for use in:

Floor-Ceiling Design Nos. D764, D922, G709, J711 and

Roof-Ceiling Design Nos. P722, P726, P731, P925 and

Beam Design Nos. N765, N767, S727, S730 and

Column Design Nos. X798, X799, Y705.

Type PC Pre-Coat for use in:

Floor-Ceiling Design Nos. D759, D860, G705, J708, J710, J804, J805, J809.

Type 280 Spray-Applied Fire Resistive Materials for use in

Floor-Ceiling Design Nos. D755, D902, D974, D976, D977, J708 and

Roof-Ceiling Design Nos. P713, P901, P902, P907, P908, P920, P922, P923 and

Beam Design Nos. N735, N761, S729 and



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Column Design No. X790.

Types 304 and 404 Spray-Applied Fire Resistive Materials for use in:

Floor-Ceiling Design Nos. D796, G716, J725 and

Wall Design No. U706.

Types 300, SB, 300AC, 300ES, 300HS, 300N, 3000, 3000ES, 400AC, 400ES Spray-Applied Fire Resistive Materials for use in:

Floor-Ceiling Design Nos. D759, D797, D799, D859, D860, D902, D904, D921, D942, D947, D974, D976, D977, D984, D988, D991, G705, G717, J708, J710, J804, J805, J809, J957, L701 and

Roof-Ceiling Design Nos. P301, P675, P676, P719, P723, P744, P752, P826, P901, P902, P907, P908, P920, P922, P923 and

Beam Design Nos. N735, N743, N759, N761, N792, N869, N873, S721, S729, S751 and

Column Design Nos. X790, Y729.

Type 300AC Spray-Applied Fire Resistive Materials for use in:

Roof-Ceiling Design No. P754.

Types 300, SB may be trowel-applied provided the materials are first mixed and pumped through standard application equipment as outlined in the manufacturer's application instructions. The minimum thickness and minimum in-place density of the Types 300 and SB stated in the individual designs shall be maintained.

Types 300AC, 300ES, 300HS, 3000, 3000ES, 400AC, 400ES must be used with Type Isolatek Qwik-Set® accelerator in accordance with the manufacturers mixing instructions. Types 300, SB, and 300N may optionally use Type Isolatek Qwik-Set® accelerator.

Type 400 Spray-Applied Fire Resistive Material for use in:

Floor-Ceiling Design Nos. D759, D799, D859, D860, D902, D904, D921, D942, D947, D974, D976, D977, D984, D988, D991, G705, G717, J708, J710, J804, J805, J809, J957, L701 and

Roof-Ceiling Design Nos. P675, P676, P719, P723, P744, P752, P826, P901, P902, P907, P908, P920, P922, P923 and



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Beam Design Nos. N735, N743, N759, N761, N792, N873, S721, S729, S751 and
Column Design No. X790.

Type 400 may be trowel-applied provided the materials are first mixed and pumped through standard application equipment as outlined in the manufacturer's application instructions. The minimum thickness and minimum in-place density of the Type 400 stated in the individual designs shall be maintained.

Type 800 Spray-Applied Fire Resistive Material investigated for exterior use in:

Floor-Ceiling Design Nos. D744, D974 and

Roof-Ceiling Design Nos. P819, P908 and

Beam Design Nos. N742, N760, S720 and

Column Design No. Y714.

Types M-II, TG Spray-Applied Fire Resistive Materials investigated for exterior use, and additionally evaluated for acid and solvent spray exposure in:

Floor-Ceiling Design Nos. D744, D759, D781, D799, D902, D922, D974, D976, D977, D988, G717, J809 and

Roof-Ceiling Design Nos. P720, P721, P819, P826, P908, P922 and

Beam Design Nos. N742, N743, N755, N759, N760, N761, N792, S720, S723, S751 and

Column Design Nos. X764, X768, XR704, XR729, XR730.

As an alternate to spraying, Type M-II may be machine mixed and trowel applied as an alternate to spraying. The minimum thickness and minimum in-place density of the Type M-II stated in the individual designs shall be maintained.

Type M-II/P Spray-Applied Fire Resistive Material investigated for exterior use, and additionally evaluated for acid and solvent spray exposure in:

Floor-Ceiling Design Nos. D744, D759, D799, D902, D988, G717.

Beam Design Nos. N742, N743, N759, N761, N792, S751 and

Column Design Nos. X764, X768, XR704, XR723, XR725, XR729, XR730, XR739.

Roof-Ceiling Design, No. P819



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As an alternate to spraying, Type M-II/P may be machine mixed and trowel applied as an alternate to spraying. The minimum thickness and minimum in-place density of the Type M-II/P stated in the individual designs shall be maintained.

Types D-C/F, II, II HS, HP, 300, SB, 300AC, 300ES, 300HS, 300N, 3000, 3000ES, 400AC, 400ES and 400 Spray-Applied Fire Resistive Materials for application with or without Type EBS or Type X adhesive/sealer. Refer to specific Design to determine if Type EBS or Type X adhesive/sealer is required. For information on Type EBS or Type X adhesive/sealer refer to Adhesives category (BYWR), Isolatek International.



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SECTION 07841 THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
1. Floors.
 2. Roofs.
 3. Walls and partitions.
 4. Smoke barriers.
- B. Related Sections include the following:
1. Division 4 Section "Unit Masonry Assemblies" for joint fillers for non-fire-resistive –rated masonry construction.
 2. Division 7 Section "Building Insulation" for safing insulation and accessories.
 3. Division 7 Section "Joint Sealants" for non-fire-resistive-rated joint sealants.
 4. Division 15 Sections specifying duct and piping penetrations.
 5. Division 16 Sections specifying cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
1. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
 2. Fire-resistance-rated floor assemblies.
 3. Fire-resistance-rated roof assemblies.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
1. Penetrations located outside wall cavities.
 2. Penetrations located outside fire-resistive shaft enclosures.
 3. Penetrations located in construction containing fire-protection-rated openings.
 4. Penetrating items larger than 4-inch- diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
- D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects

with project names and addresses, names and addresses of architects and owners, and other information specified.

- D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory," by Warnock Hersey or by another qualified testing and inspecting agency.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if appli-

cable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

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. Hilti Construction Chemicals, Inc.
 - 2. International Protective Coatings Corp.
 - 3. RectorSeal Corporation (The).
 - 4. Specified Technologies Inc.

5. 3M Fire Protection Products.
6. Tremco.
7. Bio Fireshield, Inc.
8. Dow Corning, Corp.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for fire-stop systems indicated. Accessories include, but are not limited to, the following items:
 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.3 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- C. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- D. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

- E. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- F. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- G. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- H. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

2.4 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.
- B. Sealant Colors: Provide color of exposed joint sealants to comply with the following:
 - 1. Provide custom colors to match Architect's samples.
 - 2. Match colors indicated by reference to manufacturer's standard designations.
 - 3. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.
- C. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure related Use NT, and joint substrate related Uses M, G, A, and (as applicable to joint substrates indicated) O.
 - 1. Additional Movement Capability: Provide sealant with the capability to withstand the following percentage changes in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated:
 - a. 50 percent movement in both extension and compression for a total of 100 percent movement.
 - b. 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.

2.5 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Commencing installation of firestopping shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- C. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
 - 1. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 2. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 3. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 4. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 INSTALLING FIRE RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing: uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.5 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration fire-stop systems complying with specified requirements.

END OF SECTION 07841

SECTION 07920 JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes sealants for the following applications, including those specified by reference to this Section:
- B. This Section includes sealants for the following applications:
 - 1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
 - a. Control and expansion joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors and windows.
 - e. Other joints as indicated.
 - 2. Exterior joints in the following horizontal traffic surfaces:
 - a. Control and expansion joints in brick pavers.
 - b. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - c. Joints in stone paving units, including steps.
 - d. Joints between different materials listed above.
 - e. Other joints as indicated.
 - 3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - e. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.

- f. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - g. Other joints as indicated.
 - 4. Interior joints in the following horizontal traffic surfaces:
 - a. Control and expansion joints in stone flooring.
 - b. Other joints as indicated.
- C. Related Sections include the following:
 - 1. Division 4 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
 - 2. Division 7 Section "Firestopping" for fire-resistant building joint-sealant systems.
 - 3. Division 8 Section "Glazing" for glazing sealants.
 - 4. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

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.

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. Install 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: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects

with project names and addresses, names and addresses of architects and owners, and other information specified.

- G. 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.
- H. Field Test Report Log: For each elastomeric sealant application. Include information specified in "Field Quality Control" Article.
- I. 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.
- J. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.
- K. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:
 - 1. Locate test joints where indicated or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of nonelastomeric sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 - 5. Test Method: Test joint sealants by hand-pull method described below:

- a. Install joint sealants in 60-inch- long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
 - b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
 - c. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
6. Report whether sealant in 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.
7. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of non-compliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
- D. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of 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 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: 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 ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
 3. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Installer's Warranty: Written warranty, signed by Installer agreeing 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.
- C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing 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: 20 years from date of Substantial Completion.
- D. 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 PRODUCTS AND MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules below.

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 for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

- A. SINGLE-PART URETHANE SEALANT (Sealant No. 1)
 - 1. Polyurethane Sealant: Single component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging, self-leveling type; complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, A, 0.
 - 2. Products: Subject to compliance with requirements, provide the following:
 - a. Urethane Sealant: Dynatrol I Urethane Sealant, product of Pecora.
- B. SINGLE-PART SILICONE SEALANTS (Sealant No. 2)
 - 1. Silicone Sealant: Single component solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding; complying with ASTM C 920, Type S, NS, Class 25.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Silicone Sealant:
 - b. Silpruf Silicone Sealant, product of GE Silicones.
 - c. Dow 795 Silicone Sealant, product of Dow Corning.
 - d. Pecora 864 Silicone Sealant, product of Pecora.
- C. ACRYLIC LATEX SEALANT (Sealant No. 3)
 - 1. Sealant for interior joints, exposed or paint-finished Tremco Acrylic Latex sealant manufactured by the Tremco Manufacturing Company meeting the requirements of ASTM C834.

D. ACOUSTICAL JOINT SEALANTS

1. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:
 - a. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90
 - b. Product has flame spread and smoke developed ratings of less than 25 per ASTM E 84, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.
2. Products: Subject to compliance with requirements, provide one of the following:
 - a. SHEETROCK Acoustical Sealant, product of United States Gypsum Co.
 - b. AC-20 FTR Acoustical and Insulation Sealant, product of Pecora Corp.
3. Acoustical Sealant for Concealed Joints:
 - a. BA-98, product of Pecora Corp.
 - b. Tremco Acoustical Sealant, product of Tremco, Inc.

2.4 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; 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, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 1. Type O: Open-cell material.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. 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.

2.5 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 with joint substrates.
- C. Masking Tape: Nonstaining, 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. 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 from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 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.
 - a. Glass.
 - b. Porcelain enamel.
 - c. Glazed surfaces of ceramic tile.
- B. 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.
- C. 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.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. 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.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.
- F. Install sealants by proven techniques to 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 provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. 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 sealants from surfaces adjacent to joint.
 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.
 4. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.
 5. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

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 one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
 2. Test Method: Test joint sealants by hand-pull method described below:
 - a. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
 - b. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - c. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this 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 from voids.
 - c. Whether sealant dimensions and configurations comply with 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 to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- 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 sealants 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 the original work.

3.7 ELASTOMERIC JOINT-SEALANT SCHEDULE

- A. Unless indicated otherwise on the Drawings or in other Sections, provide the following type of joint with the sealant type indicated. For joint types not indicated below, request Architect's selection of sealant type and required procedures.

- B. Interior and exterior joints
 - 1. Joints in finish carpentry and trim: Sealant No. 3.
 - 2. Interior joints for paint finish: Sealant No. 3.
 - 3. Masonry, terrazzo and stone joints: Sealant No. 1.
 - 4. Concrete joints: Sealant No. 1.
 - 5. Glass/metal joints: Sealant No. 2.
 - 6. Metal/metal joints: Sealant No. 2.
 - 7. Metal/masonry joints: Sealant No. 1.
 - 8. Metal/stone joints: Sealant No. 1.
 - 9. Metal/wood joints: Sealant No. 3.
 - 10. Metal/gypsum board joints: Sealant No. 3.
 - 11. Gypsum board/plaster joints: Sealant No. 3.
 - 12. Ceramic tile joints: Sealant No. 2.
 - 13. Ceramic tile/porcelain fixture joints: Sealant No. 2.

END OF SECTION 07920

SECTION 08110 STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fire-rated door and frame assemblies.
 - 2. Borrowed-light frames.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 4 Section "Unit Masonry Assemblies" for building anchors into and grouting frames in masonry construction.
 - 2. Division 8 Section "Flush Wood Doors."
 - 3. Division 8 Section "Door Hardware" for door hardware and weatherstripping.
 - 4. Division 8 Section "Glazing".
 - 5. Division 9 Section "Gypsum Board Assemblies" for spot grouting frames in gypsum board partitions.
 - 6. Division 9 Section "Painting" for field painting primed doors and frames.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.
- C. Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
- D. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.

1. Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.4. QUALITY ASSURANCE

- E. Provide doors and frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.
- F. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E 152, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 1. Testing Requirements: Fire door assemblies shall be tested in accordance with NFP 252 or UL 10B or C.
 2. Performance Requirements: Fire door assemblies shall meet the requirements for smoke and draft control door assemblies tested for air leakage in accordance with UL 1784 and NFP 105.

1.5 DELIVERY, STORAGE, AND HANDLING

- G. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- H. Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.
- I. Store doors and frames at building site under cover. Place units on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
 1. Steel Doors and Frames:
 - a. Pioneer Industries, or equal.
 - b. Ceco Door Products.
 - c. Republic Builders Products.

- d. Steelcraft.

2.2 MATERIALS

- A. Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569.
- B. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366, commercial quality, or ASTM A 620, drawing quality, special killed.
- C. Supports and Anchors: Fabricated from not less than 0.0478-inch- thick steel sheet; 0.0516-inch- thick galvanized steel where used with galvanized steel frames.
- D. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

2.3 DOORS

- A. Steel Doors: Provide 1-3/4-inch- thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:
 - 1. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - a. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full).
 - 2. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - a. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).

2.4 FRAMES

- A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B. Frames of 0.067-inch-thick steel sheet for:
 - 1. Level 3 steel doors.
 - 2. Wood doors.
- C. Fabricate frames with mitered or coped and continuously welded corners.

- D. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.
- E. Plaster Guards: Provide minimum 0.0179-inch- thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
- F. Grout: When required in masonry construction, as specified in Division 4 Section "Unit Masonry."

2.5 FABRICATION

- A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.
- B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch-thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
- C. Interior Door and Panel Faces: Fabricate exposed faces of doors and panels from the following material:
 - 1. Cold-rolled steel sheet.
- D. Internal Construction: One of the following manufacturer's standard core materials according to SDI standards:
 - 1. Rigid polystyrene conforming to ASTM C 578.
- E. Clearances: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom.
 - 1. Fire Doors: Provide clearances according to NFPA 80.
- F. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.
 - 1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.35 Btu/sq. ft. x h x deg F or better.

- G. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel sheet.
- H. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- I. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- J. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- K. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.
 - 1. For concealed overhead door closers, provide space, cutouts, reinforcing, and provisions for fastening in top rail of doors or head of frames, as applicable.
- L. Frame Construction: Fabricate frames to shape shown.
 - 1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
- M. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- N. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.
- C. Apply primers to doors and frames after fabrication.

2.7 STEEL SHEET FINISHES

- A. Surface Preparation: Solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).

- B. Pretreatment: Immediately after surface preparation, apply a conversion coating of type suited to organic coating applied over it.
- C. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - 1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
 - 2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
 - 3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
 - 4. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.
 - 5. Install fire-rated frames according to NFPA 80.
- C. Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100.
 - 1. Fire-Rated Doors: Install with clearances specified in NFPA 80.
 - 2. Smoke-Control Doors: Comply with NFPA 105.

3.2 ADJUSTING AND CLEANING

- A. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

- B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

SECTION 08211 FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Solid-core doors with wood-veneer faces.
 - 2. Factory finishing flush wood doors.
- B. Related Sections include the following:
 - 1. Division 8 Section "Steel Doors and Frames."
 - 2. Division 8 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, trim for openings, and louvers.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate doors to be factory finished and finish requirements.
 - 5. Indicate fire ratings for fire doors.
- C. Samples for Verification: As follows:
 - 1. Corner sections of doors approximately 8 by 10 inches with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with the following standard:
 - 1. NWWDA Quality Standard: NWWDA I.S.1-A, "Architectural Wood Flush Doors."
 - 2. AWI Quality Standard: AWI's "Architectural Woodwork Quality Standards" for grade of door, core, construction, finish, and other requirements.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
- D. Sound Rated Wood Doors: The following doors shall have an acoustical STC of 47 or better. Provide acoustically rated glazing in doors with glazing.
 - 1. Door no. 222, 222A – 222D, 223, 226, 228, 227.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.
 - 1. Individually package doors in plastic bags or cardboard cartons.
 - 2. Individually package doors in cardboard cartons and wrap bundles of doors in plastic sheeting.
- B. Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.

1.7 WARRANTY

- A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form, signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span, or do not comply with tolerances in referenced quality standard.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty shall be in effect during the following period of time after the date of Substantial Completion:
 - a. Solid-Core Interior Doors: Life of installation.

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. Flush Wood Doors:
 - a. Algoma Hardwoods Inc.
 - b. Eggers Industries; Architectural Door Division.
 - c. Mohawk Flush Doors, Inc.

2.2 DOOR CONSTRUCTION, GENERAL

- A. Doors for Transparent Finish:
 - 1. Grade: Custom, with Grade AA faces.
 - 2. Species and Cut: red oak, to match Architect's sample.
 - 3. Match between Veneer Leaves: match Architect's sample.

2.3 SOLID-CORE DOORS

- A. Interior Veneer-Faced Doors: Comply with the following requirements:

1. Core: Particleboard core.
 2. Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
- B. Sound rated doors:
1. Provide doors with an STC rating as indicated in section 1.4D and as indicated on the drawings.
- C. Fire-Rated Doors: Comply with the following requirements:
1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as required to provide fire rating indicated.
 2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated and as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, at doors indicated to have kick, mop, or armor plates.
 - c. 4-1/2-by-10-inch lock blocks.
 - d. 5-inch midrail blocking, at doors indicated to have exit devices.
 3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.

2.4 FABRICATION

- A. Fabricate flush wood doors in sizes indicated for Project site fitting.
- B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-rated doors.
- C. 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, DHI A115-W series standards, and hardware templates.
1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

2.5 FACTORY FINISHING

- A. General: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.
- B. Finish doors at factory.
- C. Transparent Finish:
 - 1. Grade: Custom.
 - 2. Finish: AWI System TR-4 conversion varnish.
 - 3. Staining: Custom to match Architect's sample.
 - 4. Sheen: Custom to match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 - 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 8 Section "Door Hardware."
- B. Manufacturer's Written Instructions: Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
 - a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING AND PROTECTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08211

SECTION 08311 ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Access doors and frames for walls and ceilings.
 - 2. Floor access doors and frames.
- B. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for blocking out openings for access doors and frames in concrete.
 - 2. Division 4 Section "Unit Masonry Assemblies" for anchoring and grouting access door frames set in masonry construction.
 - 3. Division 8 Section "Door Hardware" for mortise or rim cylinder locks and master keying.
 - 4. Division 15 Section "Duct Accessories" for heating and air-conditioning duct access doors.

1.3 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- D. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

- E. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.
- B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 for vertical access doors and frames.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from

- uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

- D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 STAINLESS-STEEL MATERIALS

- A. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316. Remove tool and die marks and stretch lines or blend into finish.
 1. Finish: Directional Satin Finish, No. 4.

2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- 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. Babcock-Davis; A Cierra Products Co.
 2. Jensen Industries.
 3. J. L. Industries, Inc.
 4. Larsen's Manufacturing Company.
 5. Milcor Inc.
- B. Flush Access Doors and Trimless Frames: Fabricated from steel sheet.
 1. Locations: Wall and ceiling surfaces.
 2. Door: Minimum 0.060-inch- thick sheet metal, set flush with surrounding finish surfaces.
 3. Frame: Minimum 0.060-inch- thick sheet metal with drywall bead flange.
 4. Hinges: Spring-loaded, concealed-pin type.
 5. Lock: Cylinder.
- C. Recessed Access Doors and Trimless Frames: Fabricated from steel sheet.
 1. Locations: Ceiling surfaces.
 2. Door: Minimum 0.060-inch- thick sheet metal in the form of a pan recessed 1 inch for acoustical tile infill.
 3. Frame: Minimum 0.060-inch- thick sheet metal designed for insertion into acoustical tile ceiling.
 4. Lock: Cylinder.

2.4 FLOOR ACCESS DOORS AND FRAMES

- 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. Babcock-Davis, A Cierra Products Co.
 2. Bilco Company (The).
 3. Cendrex Inc.
 4. J. L. Industries, Inc.
 5. Milcor Inc.
- B. Floor Doors, General: Equip each door with adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with red vinyl grip that allows for one-handed closure, and recessed lift handle.
- C. Steel Angle-Frame Floor Door at Pool: Single-leaf opening. Stainless-steel frame with 3/16- or 1/4-inch- thick, diamond-pattern, stainless-steel tread plate door; nonwatertight; loading capacity to support 150-lbf/sq. ft. pedestrian live load.
1. Fire-Resistance Rating: Not less than that of adjacent construction.
 2. Finish painted in yellow with wording "FIRE DOOR - DO NOT STORE MATERIALS ON SURFACE."
- D. Steel Angle-Frame Floor Door at 4th Floor Fan Room: Single-leaf opening. Galvanized structural-steel frame with 3/16- or 1/4-inch- 3/16-inch- 1/4-inch- thick, diamond-pattern, galvanized structural-steel tread plate door; nonwatertight; loading capacity to support 150-lbf/sq. ft. pedestrian live load.
1. Fire-Resistance Rating: Not less than that of adjacent construction.
 2. Finish painted in yellow with wording "FIRE DOOR - DO NOT STORE MATERIALS ON SURFACE."
- E. Hardware: Provide the following:
1. Hinges: Heavy-duty, zinc-coated steel stainless-steel butt hinges with stainless-steel pins.
 2. Latch: Stainless-steel slam latch.
 3. Lock: Keyed deadlock bolt
 4. Hardware Material: Stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and all brackets, hinges, pins, and fasteners.

2.5 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 1. For trimless frames with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.
 - 2. Provide mounting holes in frames for attachment of units to metal framing.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder lock, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

**SECTION 08330
ROLLING SERVICE DOORS
STORMTITE™ MODEL 625**

Display hidden notes to specifier by using "Tools"/"Options"/"View"/"Hidden Text".

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Insulated rolling service doors.

1.2 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Support framing and framed opening.
- B. Section 06200 - Finish Carpentry: Wood jamb and head trim.
- C. Section 08333 - Security Grilles.
- D. Section 08710 - Door Hardware: Product Requirements for cylinder core and keys.
- E. Section 09900 - Painting: Field applied finish.
- F. Division 16 - Electrical.

1.3 REFERENCES

- A. ANSI/DASMA 108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.
- B. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.
- C. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

- D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- E. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- F. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- G. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- H. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- J. NEMA MG 1 - Motors and Generators.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Details of construction and fabrication.
 - 4. Installation instructions.
- C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

- A. Warranty: Manufacturer's limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.
- B. Warranty: Manufacturer's limited door system warranty for 2 years for all parts and components.
- C. PowderGuard Finish
 - 1. PowderGuard Premium Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Premium Finish warranty for 2 years.
 - 2. PowderGuard Zinc Base Coat applied to guides, bottom bar, headplates plus PowderGuard Premium applied to curtain and top coat for guides, bottom bar, headplates: Manufacturer's limited Zinc Finish warranty for 4 years.
 - 3. PowderGuard Textured: Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Textured Finish warranty for 3 years.
 - 4. PowderGuard Zinc Base Coat applied to guides, bottom bar, headplates plus PowderGuard Textured applied to curtain and top coat for guides, bottom bar, headplates: Manufacturer's limited Zinc Finish warranty for 4 years.
 - 5. PowderGuard Max: Applied to curtain, guides, bottom bar, headplates: Manufacturer's limited Max Finish warranty for 5 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corporation, 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INSULATED ROLLING SERVICE DOORS

- A. Stormtite Insulated Rolling Service Doors: Overhead Door Corporation Model 625.
1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - a. Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.
 - b. Front slat fabricated of:
 - 1) 24 gauge galvanized steel.
 - 2) 22 gauge galvanized steel.
 - 3) 20 gauge galvanized steel.
 - 4) 18 gauge galvanized steel.
 - 5) 22 gauge stainless steel.
 - 6) 20 gauge stainless steel.
 - 7) Aluminum .040 inch (1 mm).
 - c. Back slat fabricated of:
 - 1) 24 gauge galvanized steel.
 - 2) 22 gauge galvanized steel.
 - 3) 24 gauge stainless steel.
 - 4) Aluminum .024 inch (.06 mm).
 - d. Slat cavity filled with CFC-free foamed-in-place, polyurethane insulation.
 - 1) R-Value: 7.7, U-Value: 0.13.
 - 2) Sound Rating: STC-21.
 2. Performance:
 - a. Through Curtain Sound Rating: Sound Rating: STC-28 (STC-30+ with HZ noise generator) as per ASTM E 90.
 - b. Installed System Sound Rating: STC-21 as per ASTM E 90.
 - c. U-factor: 0.91 NFRC test report, maximum U-factor of no higher than 1.00.
 - d. Air Infiltration: Meets ASHRAE 90.1 & IECC 2012/2015 C402.4.3 Air leakage <1.00 cfm/ft².
 3. Slats and Hood Finish:
 - a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
 - 1) Polyester Top Coat.
 - (a) Gray polyester.
 - (b) Tan polyester.
 - (c) White polyester.
 - (d) Brown polyester.
 - 2) Powder Coat:
 - (a) PowderGuard Premium powder coat color as selected by the Architect.
 - (b) PowderGuard Textured powder coat color as selected by the Architect.

- (c) PowderGuard Max powder coat, color as selected by Architect.
 - 3) Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
 - b. Stainless Steel: Slats and hood shall be stainless steel finished as follows.
 - 1) Finish: 2B mill finish.
 - 2) Finish: No. 4 satin finish.
 - c. Aluminum: Slats and hood shall be aluminum finished as follows.
 - 1) Finish: Mill finish.
 - 2) Finish: Clear anodized finish.
 - 3) Finish: Bronze anodized finish.
 - 4) Finish: Powder Coat:
 - (a) PowderGuard Premium powder coat color as selected by the Architect.
 - (b) PowderGuard Textured powder coat color as selected by the Architect.
 - (c) PowderGuard Max powder coat, color as selected by Architect.
- 4. Weatherseals:
 - a. Vinyl bottom seal, exterior guide and internal hood seals.
 - b. Interior guide weatherseal.
 - c. Lintel weatherseal.
 - d. Air Infiltration Package, IECC 2012/2015 listed; product to meet C402.4.3 2012 Air leakage <1.00 cfm/ft².
 - 1) Air infiltration perimeter seal package includes: guide cover, guide cap, dual brush exterior guide seal, 4 inch finned lintel brush seal and vinyl bottom seal.
- 5. Bottom Bar:
 - a. Two prime painted steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
 - b. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
 - c. Two stainless steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
 - d. Extruded aluminum angle minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
- 6. Guides: Three structural steel angles.
- 7. Brackets:
 - a. Hot rolled prime painted steel to support counterbalance, curtain and hood.
 - b. Galvanized steel to support counterbalance, curtain and hood.
 - c. Stainless steel to support counterbalance, curtain and hood.
- 8. Finish; Bottom Bar, Guides, Headplate and Brackets:
 - a. PowderGuard Premium powder coat in black color.
 - b. PowderGuard Premium powder coat color as selected by the Architect.

- c. PowderGuard Zinc base coat, gray.
 - d. PowderGuard Zinc base coat with PowderGuard Premium powder coat color as selected by the Architect.
 - e. PowderGuard Textured powder coat color as selected by the Architect.
 - f. Finish: PowderGuard Max powder coat color as selected by the Architect.
9. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
10. Hood: Provide with internal hood baffle weatherseal.
 - a. 24 gauge galvanized steel with intermediate supports as required.
 - b. Stainless steel, 24 gauge hood with intermediate supports as required.
 - c. Aluminum hood with intermediate supports as required.
11. Manual Operation:
 - a. Chain hoist.
 - b. Crank operation.
12. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - a. Sensing Edge Protection:
 - 1) Pneumatic sensing edge.
 - 2) Electric sensing edge.
 - b. Operator Controls:
 - 1) Push-button operated control stations with open, close, and stop buttons.
 - 2) Key operation with open, close, and stop controls.
 - 3) Push-button and key operated control stations with open, close, and stop buttons.
 - 4) Controls for interior location.
 - 5) Controls for exterior location.
 - 6) Controls for both interior and exterior location.
 - 7) Controls surface mounted.
 - 8) Controls flush mounted.
 - c. Special Operation:
 - 1) Vehicle detector operation.
 - 2) Radio control operation.
 - 3) Card reader control.
 - 4) Photocell operation.
 - 5) Door timer operation.
 - 6) Commercial light package.
 - 7) Explosion and dust ignition proof control wiring.
 - d. Motor Voltage: 115/230 single phase, 60 Hz.
13. Wind Load Design:
 - a. Standard wind load shall be 20 PSF.

- b. Miami-Dade County NOA ____.
 - c. FBC certification FL# ____.
 - d. TDI Approval # ____.
14. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.
15. Locking:
- a. Chain keeper locks for chain hoist operation.
 - b. Interior slide bolt lock for electric operation with interlock switch.
 - c. Cylinder lock for electric operation with interlock switch.
16. Wall Mounting Condition:
- a. Face-of-wall mounting.
 - b. Between jambs mounting.
17. Insulated Vision Lites: Provide with uniformly spaced openings.
- a. Size: 3 inch by 5/8 inch (76 mm by 16 mm)
 - b. Size: 10 inch by 1 inch (254 mm by 25.4 mm)
 - c. Provide with dual wall polycarbonate lites.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.
- F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
- G. Install perimeter trim and closures.
- H. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION 08330



AIR INFILTRATION OPTION



STORMTITE™ MODEL 625

STORMTITE™ MODEL 625 NOW OFFERS AN AIR INFILTRATION PACKAGE that is ICC-ES listed and meets the 2012/2015 IECC code requirements of an air infiltration rating lower than 1.0 cfm/ft² for rolling steel doors. This provides assurance that Model 625 meets the IECC consensus standards for air infiltration through test reports, calculations, examination of product information and quality control methods.

The insulated slats of the Stormtite™ 625 combined with this package offer a superior perimeter seal, that provides improved performance, minimized air infiltration and improved energy efficiency.

The package includes:



- 1 The guide cover (shown) and cap blocks air transference through the length and the top of the guides.
- 2 The lintel seal minimizes air transference across the top of the door system.
- 3 The dual brush guide seal minimizes air transference between slats at the guide.



- 4 The bottom astragal is attached to the base of the bottom bar and minimizes air transference across the base of the door system.

Perfect for distribution facilities, education, healthcare, hospitality, industrial, public space, retail and transportation.

You can download a copy of ICC-ES listing at www.icc-es.org under Evaluation Reports (Search for report number 1017).



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INDUSTRY LEADING
COMMERCIAL & INDUSTRIAL SOLUTIONS

**SECTION 084413
GLAZED ALUMINUM CURTAIN WALL**

PART 1 GENERAL

1.1 Work Included

- A. Furnish and install architectural aluminum curtain wall complete with related components as shown on drawings and specified in this section.
- B. Curtain Wall System shall be EFCO® Series 5600 Outside Glazed with Duracast Fiberglass Pressure Plate. Other manufacturers requesting approval to bid their product as an equal must submit the following information fifteen days prior to close of bidding.
 - 1. A proposal drawing showing full size details of all curtain wall components including all anchors and building attachments.
 - 2. Test reports documenting compliance with requirements of Section 1.05.
- C. Glass
 - 1. Reference Section 08800 – Glazing
- D. Single Source Requirement
 - 1. All products listed in Section 1.02 shall be by the same manufacturer.

1.2 Related Work

- A. Section 08800 – Glazing
- B. Section 085113 – Aluminum Windows

1.3 Items Furnished but Not Installed

1.4 Items Installed but Not Furnished

1.5 Laboratory Testing and Performance Requirements

- A. Test Units
 - 1. Air, water, and structural test unit size shall be a minimum of two stories high and three lites wide.
 - 2. Thermal test unit sizes shall be 80" (2032 mm) wide x 80" (2032 mm) high with one intermediate vertical mullion and two lites of glass.
- B. Test Procedures and Performance
 - 1. Air Infiltration Test
 - a. Test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf (300 Pa).
 - b. Air infiltration shall not exceed .06 cfm/SF (.31 l/s•m²) of unit.

2. Water Resistance Test
 - a. Test unit in accordance with ASTM E 331.
 - b. The test for static water penetration (ASTM E 331) shall be conducted at an air pressure difference of 15.0 psf (720 Pa). There shall be no water leakage as defined by AAMA 501.1, paragraph 5.5.
3. Uniform Load Deflection Test
 - a. Test in accordance with ASTM E 330.
 - b. Deflection under design load shall not exceed L/175 for spans less than 162" (4114 mm).
 - c. Deflection under design load shall not exceed L/240 +1/4" (6 mm) for spans greater than 162" (4114 mm).
4. Uniform Load Structural Test
 - a. Test in accordance with ASTM E 330 at a pressure 1.5 times the design wind pressure in 1.05.B.3.b.
 - b. At conclusion of the test there shall be no glass breakage, permanent damage to fasteners, curtain wall parts, or any other damage that would cause the curtain wall to be defective.
5. Condensation Resistance Test (CRF)
 - a. Test unit in accordance with AAMA 1503.1.
 - b. Condensation Resistance Factor (CRF) shall not be less than ___ (frame) when glazed with ___ center of glass U-Factor. (See chart at end of section).
6. Condensation Resistance (CR)
 - a. With ventilators closed and locked, test unit in accordance with NFRC 500-2010.
 - b. Condensation Resistance (CR) shall not be less than ___ when glazed with ___ center of glass U-Factor. (See chart at end of section).
7. Thermal Transmittance Test (Conductive U-Factor)
 - a. With ventilators closed and locked, test unit in accordance with NFRC 100-2010.
 - b. Conductive thermal transmittance (U-Factor) shall not be more than ___ BTU/hr•ft²•°F (___ W/m²•K) when glazed with ___ center of glass U-Factor. (See chart at end of section).

Glass Comparison Chart				
Glass	C.O.G.² U-Factor	U-Factor¹	Frame CRF³	CR¹
1" IG	0.48	0.53 BTU/hr•ft ² •°F (3.01 W/m ² •K)	74	*
1" IG	0.30	0.37 BTU/hr•ft ² •°F (2.10 W/m ² •K)	74	61
1" IG	0.24	0.32 BTU/hr•ft ² •°F (1.82 W/m ² •K)	74	65
1" IG	0.20	0.29 BTU/hr•ft ² •°F (1.65 W/m ² •K)	74	*

¹U-Factor and Condensation Resistance (CR) are based on a nominal size of 47.25" (1200 mm) x 59" (1500 mm) with two lites of glass using NFRC-100, and 500 - 2010. ²Intercept[®] Spacer. ³Based on AAMA 1503.1

8. Seismic Performance
 - a. Test unit in accordance to AAMA 501.4 system to meet design displacement of 0.010 x the greater adjacent story height and ultimate displacement of 1.5 x the design displacement.
9. Sound Transmission Loss
 - a. Test unit in accordance with ASTM E 90-02.
 - b. Sound Transmission Class (STC) shall not be less than 29.

C. Project Wind Loads - **Refer to Structural Drawings for project Wind Loads.**

1. The system shall be designed to withstand wind loads normal to the plane of the wall as per the loads listed on the Structural Drawings.

1.6 Field Testing and Performance Requirements-Refer to Elevation 1/A-200 for area to be tested.

A. Test Units

1. Air, water, and structural test unit size shall be a representative sample of typical construction and shall have no outstanding punch list or other visible defects. If no test area and/or location have been identified, the persons doing the test shall select an area. This area shall be selected to provide representative performance data, usually a minimum of 100 ft². The area to be tested shall include perimeter caulking, typical splices, frame intersections, and, if applicable, at least 2 entire vision lites and 2 entire spandrel lites containing an intermediate horizontal member. All operable components within the test area shall be isolated and exempt from the test procedure.

B. Test Procedures and Performance

1. Air Infiltration Test
 - a. Test unit in accordance with AAMA 503-03 for field testing. The unit test shall be conducted at a minimum uniform static test pressure differential of at least 1.57 psf (75 Pa), but at a pressure differential not to exceed 6.24 psf (300 Pa).
 - b. The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specification rate or .09 cfmSF (.45 l/s•m²), whichever is greater.
2. Water Resistance Test
 - a. Test unit in accordance with AAMA 503-03.
 - b. The field water penetration resistance tests shall be conducted at a static test pressure of two-thirds of the specified project water penetration test pressure, but not less than 6.24 psf (300 Pa).

1.7 Quality Assurance

- A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.05.
- B. Test reports shall be accompanied by the curtain wall manufacturer's letter of certification stating that the tested curtain wall meets or exceeds the referenced criteria for the appropriate curtain wall type.

1.8 References

1.9 Submittals

- A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
 - 1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

1.10 Warranties

- A. Total Curtain Wall Installation
 - 1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total curtain wall installation. This includes the glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc. as it relates to air, water, and structural adequacy and the specifications and approved shop drawings.
 - 2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at their expense during the warranty period.
- B. Window Material and Workmanship
 - 1. Provide written guarantee against defects in material and workmanship for 3 years from the date of final shipment.
- C. Glass
 - 1. Provide written warranty for insulated glass units, that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
 - 2. Warranty period shall be for 10 (ten) years.
- D. Finish
 - 1. Warranty period shall be for 3 years from the date of final shipment.
 - 2. Provide organic finish warranty based on AAMA standard 2605.

PART 2 PRODUCTS

2.1 Materials

- A. Aluminum
 - 1. Extruded aluminum shall be 6063-T6 alloy and temper.
- B. Glass
 - 1. Ship open for 1" Insulated glass.
- C. Anchors
 - 1. Perimeter and floor line anchors shall be aluminum or steel. All steel anchors shall be properly insulated from the aluminum.
- D. Duracast Pressure Plate
 - 1. Material shall be a fiberglass composite with a Flexural strength of no less than 82 ksi (565 Mpa) along the lineal's major axis.
 - 2. Material thermal conductivity shall be no more than 2 BTU·in/hr·ft²·°F (0.289 W/m²·K)

2.2 Fabrication

- A. General
 - 1. All aluminum vertical and horizontal extrusions shall have a minimum wall thickness of .093" (2.3 mm) to .125" (3 mm).
- B. Frame
 - 1. Frame components shall be mechanically fastened by means of extruded aluminum shear blocks attached to vertical mullions.
 - 2. Curtain wall system is able to accommodate separate interior and exterior finishes and colors.
- C. Glazing
 - 1. Outside glazed curtain wall system shall be dry glazed with an exterior Duracast® pressure plate and snap cover with interior and exterior dense EPDM preset gaskets.

2.3 Finishes

- 1. Anodic
 - a. Finish all exposed areas of aluminum windows and components with electrolytically- deposited color in accordance with Aluminum Association Designation.
- 2. Organic

- a. Liquid Fluoropolymer Aluminum Extrusion Coatings, AAMA 2605-20: Minimum 70 percent PVDF resin by weight, in color coat [and clear topcoat, if required]. Color as selected from one of the following:
 - I. EFCO Ultrapon Color Card
 - II. Sherwin-Williams Coil Coatings Fluropon Color Card – [Fluropon] [Fluropon Classic] [Fluropon Classic II] [Fluropon Premiere]
 - III. Sherwin-Williams Coil Coatings Metal Trends Color Card - Sherwin-Williams Coil Coatings Fluropon Color Card – [Fluropon] [Fluropon Classic] [Fluropon Classic II] [Fluropon Premiere]

PART 3 EXECUTION

3.1 Inspection

- A. Job Conditions
 - 1. All openings shall be prepared by others to the proper size and shall be plumb, level, and in the proper location and alignment as shown on the architect's drawings.
 - 2. Provide for manufacturer representation to conduct pre-installation site meeting.

3.2 Installation

- A. Use only skilled tradesmen with work done in accordance with approved shop drawings and established specifications, and erect all curtain wall components to all building bench marks and column center lines.
- B. Plumb and align curtain wall faces in a single plane for each wall plane, and erect curtain wall materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, building movement, and specified wind loads.
- C. Adjust windows in curtain wall for proper operation after installation.
- D. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material, leave all exposed surfaces and joints clean and smooth.

3.3 Anchorage

- A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.4 Protection and Cleaning

- A. The general contractor shall protect the aluminum materials and finish against damage from construction activities and harmful substances. The general contractor

shall remove any protective coatings as directed by the architect, and shall clean the aluminum surfaces as recommended for the type of finish applied.

- B. A bi-annual sweetwater rinse is recommended to prohibit dirt, dust, and debris from accumulation on the surface of the coating and to help maintain the aesthetic of the coating.

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END OF SECTION 084413

SECTION 085113 ALUMINUM WINDOWS

PART 1 GENERAL

1.1 Work Included

- A. Furnish and install aluminum architectural windows complete with hardware and related components as shown on drawings and specified in this section.
- B. All windows shall be EFCO® Series 325X [325G] Thermal AW-PG120-C Casement. Other manufacturers requesting approval to bid their product as an equal must submit the following information fifteen days prior to close of bidding.
 - 1. A sample window, 36" (914 mm) x 24" (610 mm) single unit, as per requirements of architect.
 - 2. Test reports documenting compliance with requirements of Section 1.05.
- C. Glass and Glazing
 - 1. All units shall be factory glazed.
- D. Single Source Requirement
 - 1. All products listed in Section 1.02 shall be by the same manufacturer.

1.2 Related Work

- A. Section 08800 – Glazing
- B. Section 085113 – Aluminum Windows

1.3 Items Furnished but Not Installed

1.4 Items Installed but Not Furnished

1.5 Laboratory Testing and Performance Requirements

- A. Test Units
 - 1. Air, water, and structural test unit shall conform to requirements set forth in AAMA/WDMA/CSA 101/I.S.2/A440-17 and manufacturer's standard locking/operating hardware and insulated glazing configuration.
 - 2. Thermal test unit sizes shall be 24" (609.6 mm) x 60" (1524 mm). Unit shall consist of a casement vent.
- B. Test Procedures and Performances
 - 1. Windows shall conform to all AAMA/WDMA/CSA 101/I.S.2/A440-17 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.

2. Life Cycle Testing
 - a. Test in accordance with AAMA 910. There shall be no damage to fasteners, hardware parts, support arms, activating mechanisms, or any other damage that would cause the window to be inoperable. Air infiltration and water resistance tests shall not exceed specified requirements.
3. Air Infiltration Test
 - a. With ventilators closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.27 psf (300 Pa).
 - b. Air infiltration shall not exceed .10 cfm/SF (.50 l/s•m²) of unit.
4. Water Resistance Test
 - a. With ventilators closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 15.0 psf (720 Pa).
 - b. There shall be no uncontrolled water leakage.
5. Uniform Load Structural Test
 - a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 180.5 psf (8640 Pa), both positive and negative.
 - b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.
6. Forced Entry Resistance
 - a. Windows shall be tested in accordance to ASTM F 588 and meet the requirements of performance grade 40.
8. Condensation Resistance Test (CRF)
 - a. Test unit in accordance with AAMA 1503.1.
 - b. Condensation Resistance Factor (CRF) shall not be less than ____ (frame) when glazed with ____ center of glass U-Factor. (See chart at end of section).
9. Condensation Resistance (CR)
 - a. With ventilators closed and locked, test unit in accordance with NFRC 500-2010.
 - b. Condensation Resistance (CR) shall not be less than ____ when glazed with ____ center of glass U-Factor. (See chart at end of section).
10. Thermal Transmittance Test (Conductive U-Factor)
 - a. With ventilators closed and locked, test unit in accordance with NFRC 100-2010.
 - b. Conductive thermal transmittance (U-Factor) shall not be more than ____ BTU/hr•ft²•°F (____ W/m²•K) when glazed with ____ center of glass U-Factor. (See chart at end of section).

Glass Comparison Chart				
Glass	C.O.G.² U-Factor	U-Factor¹	Frame CRF³	CR¹
1" IG	0.48	0.59 BTU/hr•ft ² •°F (3.35 W/m ² •K)	67	40
1" IG	0.29	0.49 BTU/hr•ft ² •°F (2.78 W/m ² •K)	67	45

1" IG	0.24	0.46 BTU/hr•ft ² •°F (2.61 W/m ² •K)	67	46
1" IG	0.20	0.44 BTU/hr•ft ² •°F (2.33 W/m ² •K)	67	46

¹U-Factor and Condensation Resistance (CR) are based on a nominal size of 24" (600 mm) x 59" (1500 mm) using NFRC-100, and 500 - 2010.

²Intercept® Spacer. ³Based on AAMA 1503.1

C. Project Wind Loads - **Refer to Structural Drawings for project Wind Loads.**

1. The system shall be designed to withstand wind loads normal to the plane of the wall as per the loads listed on the Structural Drawings.

1.6 Field Testing and Performance Requirements-Refer to Elevation 3/A-200 for area to be tested.

- A. Windows shall be field tested in accordance with AAMA 502, "Voluntary Specification for Field Testing of Windows and Sliding Glass Doors," using Test Method A.
 1. Test one additional window or two percent of the window installation, whichever is greater, for air infiltration and water penetration as specified.
 2. Cost for all successful tests, both original and retest shall be paid by the owner. All unsuccessful tests, both original and retest, shall be paid by the responsible contractor.
 3. Testing shall be by an AAMA accredited testing agency selected by the architect and window manufacturer and employed by the responsible contractor.
 4. Air infiltration field tests shall be conducted at the same uniform static test pressure as the laboratory test unit. The Maximum allowable rate of air leakage shall not exceed 1.5 times the laboratory test unit for hardware and glazing types consistent with the laboratory test unit. Performance values may be reduced due to deviations from the laboratory test unit such as product size, configuration, hardware selected, and glazing configuration. The field test air leakage rate shall not exceed 1.5 times the maximum allowable laboratory performance specified in the testing criteria listed in Section 1.05.A.1 for any configuration.
 5. Water penetration field tests shall be conducted at a static test pressure of 2/3 of the laboratory test performance values for hardware and glazing types consistent with the laboratory test unit. Performance values may be reduced due to deviations from the laboratory test unit such as product size, configuration, hardware selected, and glazing variations. The field test water test pressure shall not be less than 2/3 of the minimum allowable laboratory performance specified in the testing criteria listed in Section 1.05.A.1 for any configuration.

1.7 Quality Assurance

- A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.05.

- B. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the referenced criteria for the appropriate window type.

1.8 References

1.9 Submittals

- A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
 - 1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.
- B. An NFRC Component Modeling Approach (CMA) generated label certificate shall be provided by the manufacturer. The label certificate shall be project specific and will contain the thermal performance ratings of the manufacturer's framing combined with the specified glass, and the glass spacer used in the fabrication of the glass, at NFRC standard test size as defined in table 4-3 in NFRC 100-2010.

1.10 Warranties

- A. Total Window Installation
 - 1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the specifications and approved shop drawings.
 - 2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at their expense during the warranty period.
- B. Window Material and Workmanship
 - 1. Provide written guarantee against defects in material and workmanship for 5 years from the date of final shipment.
- C. Glass
 - 1. Provide a written warranty for insulated glass units that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
 - 2. Warranty period shall be for 10 (ten) years.
- D. Finish
 - 1. Warranty period shall be for 3 years from the date of final shipment.

PART 2 PRODUCTS

2.1 Materials

- A. Aluminum
 - 1. Extruded aluminum shall be 6063-T6 alloy and tempered.
- B. Hardware
 - 1. Locking handles shall be cam type and manufactured from a white bronze alloy with a US25D brushed finish.
 - 2. Operating Hardware
 - a. Concealed 4-bar stainless steel arms.
OR
 - a. Precision machined aluminum 5 knuckle butt hinges with Teflon bushings and stainless steel pins.
- D. Weather-Strip
 - 1. All weather-strip shall be Santoprene® or equal.
- E. Glass
 - 1. Insulated glass shall be 1" thick tempered.
- F. Thermal Barrier
 - 1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
 - 2. The thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions.
 - 3. Pour and debridge urethane thermal barriers shall not be permitted.

2.2 Fabrication

- A. General
 - 1. All aluminum frame and vent extrusions shall have a minimum wall thickness of .125" (3 mm).
 - 2. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
 - 3. Depth of frame and vent shall not be less than 3 1/4" (82 mm).
 - 4. All frame and vent members shall be able to accommodate separate interior and exterior finishes and colors.
- B. Frame
 - 1. Frame components shall be mechanically fastened.

C. Ventilator

1. All vent extrusions shall be tubular.
2. Each corner shall be mitered, reinforced with an extruded corner key, hydraulically crimped, and "cold welded" with epoxy adhesive.
3. Each vent shall utilize two rows of weather stripping installed in specifically designed dovetail grooves in the extrusion. The exterior gasket will be omitted at the vent bottom rail for project-out vents and at the vent top rail for project-in vents, allowing air to pressure equalize the void between the vents and frame.
4. The vent shall present a flush appearance with the exterior and interior of the main frame when in the closed position.

All operable windows shall have screens.

D. Screens

1. Screen frames shall be extruded.
2. Screen mounting holes in the window frame shall be factory drilled.
3. Screen mesh shall be aluminum or fiberglass.

E. Glazing

1. All units shall be glazed with the manufacturer's standard sealant process provided the glass is held in place by a removable, extruded aluminum, glazing bead. The glazing bead must be isolated from the glazing material by a gasket.
2. All units shall be glazed with a minimum of 1/2" glass bite.

2.3 Finishes

1. Anodic

- a. Finish all exposed areas of aluminum windows and components with electrolytically- deposited color in accordance with Aluminum Association Designation.

2. Organic

- a. Liquid Fluoropolymer Aluminum Extrusion Coatings, AAMA 2605-20: Minimum 70 percent PVDF resin by weight, in color coat [and clear topcoat, if required]. Color as selected from one of the following:
 - I. EFCO Ultrapon Color Card
 - II. Sherwin-Williams Coil Coatings Fluropon Color Card – [Fluropon] [Fluropon Classic] [Fluropon Classic II] [Fluropon Premiere]
 - III. Sherwin-Williams Coil Coatings Metal Trends Color Card - Sherwin-Williams Coil Coatings Fluropon Color Card – [Fluropon] [Fluropon Classic] [Fluropon Classic II] [Fluropon Premiere]

PART 3 EXECUTION

3.1 Inspection

- A. Job Conditions
 - 1. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with approved shop drawings.
 - 2. Provide for manufacturer representation to conduct pre-installation site meeting.

3.2 Installation

- A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.
- B. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.
- C. Adjust windows for proper operation after installation.
- D. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.3 Anchorage

- A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.4 Protection and Cleaning

- A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the general contractor.
- B. A bi-annual sweet water rinse is recommended to prohibit dirt, dust, and debris from accumulation on the surface of the coating and to help maintain the aesthetic of the coating.

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END OF SECTION 085113

SECTION 08710 FINISH HARDWARE

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work in this section.

1.2 DESCRIPTION OF WORK

- A. The work of this section includes the furnishing of all Finish Hardware as required by the plans and specifications.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Carefully examine all of the Contract Documents for requirements which effect the work in this section.
- B. Other specifications which directly relate to work of this section include, but are not limited to the following:
 - 1. Section — Hollow Metal
 - 2. Section — Wood Doors
 - 3. Section — Electrical Wiring

1.4 QUALITY ASSURANCE

- A. Source: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer. For standardization, provide all products without further substitution.

1.5 TESTS

- A. Fire Resistance: Where fire resistance ratings are indicated or required (authorities having jurisdiction) provide finish hardware where fire resistance rating has been tested by independent agencies acceptable to the Architect and authorities having jurisdiction.
 - 1. Provide UL, WH or RM labeled assemblies.

1.6 SUBMITTALS

- A. Product Data: Submit manufacturers product data, installation instructions, use limitations and recommendations for each material used. Provide certificates stating that materials comply with requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in sealed and labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.8 COORDINATION

- A. Coordination: In a timely fashion, furnish information as may be required by other trades.

PART 2- PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Provide only the products of the following manufacturers.
 1. Schlage (locksets, cylinders)
 2. PBB Hinges (butt hinges)
 3. LCN (door closers)
 4. Von Duprin (exit devices)
 5. Other manufacturers as listed herein

2.02 MATERIALS AND PRODUCTS **Refer to Hardware Sets on Drawing A-900.**

2.03 FINISHES OF ALL HARDWARE **Refer to Hardware Sets on Drawing A-900.**

PART 3- EXECUTION

3.1 INSTALLATION

- A. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in the section. Beginning work means installer accepts substrates and conditions.

3.2 ADJUSTING, CLEANING AND PROTECTION

- A. Adjust operating parts to work easily, smoothly and correctly.
- B. Touch up damaged coatings and finishes to eliminate evidence of repair.
- C. Repair minor damage to eliminate all evidence of repair. Remove and replace work which can not be satisfactorily repaired.
- D. Clean exposed surfaces using materials and methods recommended by manufacturer of material or products being cleaned. Remove and replace work that can not be successfully cleaned.

4.1 HARDWARE SETS *Refer to Hardware Sets on Drawing A-900.*

END OF SECTION 085113

SECTION 08800 GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
 - 2. Doors.
 - 3. Glazed curtain walls.
 - 4. Glazed entrances.
 - 5. Interior borrowed lites.
 - 6. Storefront framing.
 - 7. Sloped Glazing.
- B. Related Sections include the following:
 - 1. Division 8 Section "Steel Doors & Frames."
 - 2. Division 8 Section "Flush Wood Doors".
 - 3. Division 8 Section "Aluminum Windows."

1.3 DEFINITIONS

- A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.
- B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- C. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
 - 1) For monolithic-glass lites heat treated to resist wind loads.
 - 2) For insulating glass.
 - 3) For laminated-glass lites.
 - d. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.
 - e. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 2. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- wide interspace.
 3. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq. ft. x h x deg F.
 4. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
 5. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch- square Samples for glass and of 12-inch- long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- C. Samples: For the following products, in the form of 12-inch- square Samples for glass.
 1. Wired glass.
 2. Insulating glass for each designation indicated.
- D. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- F. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations for Clear Glass: Obtain clear float glass from one primary-glass manufacturer.

- C. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.
- D. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- E. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
- F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
 - 2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines".
- H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:
 - 1. Insulating Glass Certification Council.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.9 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. EFCO shall furnish all applicable Division 8 products for the Aluminum Windows and Curtain Wall to ensure consistent product quality and compatibility.
- B. Products: Subject to compliance with requirements, provide one of the products indicated in schedules at the end of Part 3.

2.2 PRIMARY FLOAT GLASS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in schedules at the end of Part 3.

2.3 HEAT-TREATED FLOAT GLASS

- A. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.

2.4 WIRED GLASS

- A. Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 6.4 mm thick; of form and mesh pattern indicated below:
 - 1. Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:
 - a. Mesh m2 (square).
- B. 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. Polished Wired Glass:
 - a. Ashai Glass Co./Ama Glass Corp or equal.

- b. Pilkington Glass Ltd, or equal.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.
- B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
- C. Sealing System: Dual seal, with primary and secondary sealants as follows:
1. Manufacturer's standard sealants.
- D. Spacer Specifications: Manufacturer's standard spacer material and construction.

2.6 ELASTOMERIC GLAZING SEALANTS

- E. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.
- F. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

2.7 GLAZING TAPES

2.7.1.1.1 Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

2.7.1.1.1.1 AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

2.7.1.1.2 Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

2.7.1.1.2.1 Type 1, for glazing applications in which tape acts as the primary sealant.

2.7.1.1.2.2 Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7.1.2 MISCELLANEOUS GLAZING MATERIALS

2.7.1.2.1 General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

2.7.1.2.2 Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

2.7.1.2.3 Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

2.7.1.2.4 Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

2.7.1.2.5 Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.7.1.3 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

2.7.1.3.1 Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of

product manufacturer and referenced glazing standard, to comply with system performance requirements.

2.7.1.3.2 Grind smooth and polish exposed glass edges.

Part 3 - EXECUTION

3.6.1.1 EXAMINATION

3.6.1.1.1 Examine framing glazing, with Installer present, for compliance with the following:

3.6.1.1.1.1 Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

3.6.1.1.1.2 Presence and functioning of weep system.

3.6.1.1.1.3 Minimum required face or edge clearances.

3.6.1.1.1.4 Effective sealing between joints of glass-framing members.

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

3.6.1.2 PREPARATION

3.6.1.2.1 Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.6.1.3 GLAZING, GENERAL

3.6.1.3.1 Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

3.6.1.3.2 Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

3.6.1.3.3 Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

3.6.1.3.4 Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

- 3.6.1.3.5 Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- 3.6.1.3.6 Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- 3.6.1.3.7 Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:
 - 3.6.1.3.7.1 Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 3.6.1.3.7.2 Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- 3.6.1.3.8 Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- 3.6.1.3.9 Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.6.1.4 TAPE GLAZING

- 3.6.1.4.1 Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- 3.6.1.4.2 Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- 3.6.1.4.3 Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- 3.6.1.4.4 Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- 3.6.1.4.5 Do not remove release paper from tape until just before each glazing unit is installed.

3.6.1.4.6 Apply heel bead of elastomeric sealant.

3.6.1.4.7 Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.6.1.4.8 Apply cap bead of elastomeric sealant over exposed edge of tape.

3.6.1.5 GASKET GLAZING (DRY)

3.6.1.5.1 Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

3.6.1.5.2 Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

3.6.1.5.3 Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

3.6.1.5.4 Install gaskets so they protrude past face of glazing stops.

3.6.1.6 SEALANT GLAZING (WET)

3.6.1.6.1 Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

3.6.1.6.2 Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

3.6.1.6.3 Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6.1.7 PROTECTION AND CLEANING

- 3.6.1.7.1 Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- 3.6.1.7.2 Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- 3.6.1.7.3 Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- 3.6.1.7.4 Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- 3.6.1.7.5 Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.6.1.8 MONOLITHIC FLOAT-GLASS SCHEDULE

- 3.6.1.8.1 Uncoated Clear Float Glass: Where glass below is indicated, provide Type I (transparent glass, flat), Class 1 (clear) glass lites complying with the following:
 - 3.6.1.8.1.1 Uncoated Clear Annealed Float Glass: Annealed or Kind HS (heat strengthened), Condition A (uncoated surfaces) where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with performance requirements.
 - 3.6.1.8.1.2 Uncoated Clear Heat-Strengthened Float Glass: Kind HS (heat strengthened).
 - 3.6.1.8.1.3 Uncoated Clear Fully Tempered Float Glass: Kind FT (fully tempered).

3.6.1.9 INSULATING-GLASS SCHEDULE

- 3.6.1.9.1 Passive Solar Low-E Insulating-Glass Units:
 - 3.6.1.9.1.1 Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.

3.6.1.9.1.2 Interspace Content: Argon.

3.6.1.9.1.3 Outdoor Lite: Class 1 (clear) float glass.

3.6.1.9.1.3.1 Kind HS (heat strengthened).

3.6.1.9.1.4 Indoor Lite: Class 1 (clear) float glass.

3.6.1.9.1.4.1 Kind FT (fully tempered).

3.6.1.9.1.5 Low-E Coating: Pyrolytic or sputtered on second or third surface,
"Solarban 60 Solar Control Low-E , PPG Industries.

3.6.1.9.1.6 Indoor lite interior face shall have sandblasted pattern (lines
covering 15 to 30 percent of glazing) glazing at window types
L, M, M-1, N, AND R.

3.6.1.9.2 Sound Control Glass Units:

3.6.1.9.2.1 Laminated Glass Lite: Kind LHS, consisting of two lites of heat-
strengthened float glass.

3.6.1.9.2.1.1 Outer Lite: Class 1 (clear) float glass.

3.6.1.9.2.1.1.1 Kind FT (Fully tempered).

3.6.1.9.2.1.1.2 Thickness: 3.0 mm.

3.6.1.9.2.1.2 Inner Lite: Class 1 (clear) float glass.

3.6.1.9.2.1.2.1 Kind FT (Fully tempered).

3.6.1.9.2.1.2.2 Thickness: 3.0 mm.

3.6.1.9.2.1.3 Plastic Interlayer:

3.6.1.9.2.1.3.1 Thickness: 0.090 inch.

3.6.1.9.2.1.3.2 Interlayer Color: Clear.

3.6.1.9.2.2 Interspace Content: Air.

3.6.1.9.2.3 Inner Lite: : Class 1 (clear) float glass.

3.6.1.9.2.3.1 Kind FT (Fully tempered).

3.6.1.9.2.3.2 Thickness: 6.0 mm.

END OF SECTION 08800

SECTION 09250 GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Nonload-bearing steel framing members for gypsum board assemblies.
 - 2. Interior gypsum board.
 - 3. Exterior gypsum board for ceilings and soffits.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 7 Section "Firestopping" for firestopping systems and fire-resistance-rated joint sealants.
 - 2. Division 9 Section "Gypsum Shaft-Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.

1.3 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

- A. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.

1.6 QUALITY ASSURANCE

- A. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.
- B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.
- D. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:
 - 1. Fire-Resistance Ratings: As indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Deflection and Firestop Track: Top runner provided in fire-resistance-rated assemblies indicated is labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Mockups: Prior to finishing gypsum board assemblies, construct mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects of finishes as well as qualities of materials and execution. Simulate finished lighting conditions for review of in-place unit of Work.
 - 1. Construct mockups for each of the following applications:
 - a. Wall surfaces indicated to receive nontextured paint finishes.
 - b. Ceiling surfaces indicated to receive nontextured paint finishes.
 - c. Surfaces indicated to receive textured paint finishes.
 - d. Surfaces indicated to receive textured finishes and textured finishes specified in this Section.
 - 2. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
 - a. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
 - b. Notify Architect one week in advance of the dates and times when mockups will be constructed.
 - c. Demonstrate the proposed range of aesthetic effects and workmanship.

- d. Obtain Architect's approval of mockups before start of final unit of Work.
- e. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 1) When directed, demolish and remove mockups from Project site.
 - 2) Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.8 PROJECT CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.
- B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.
- C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
 - 1. Steel Framing and Furring:
 - a. National Gypsum Co.; Gold Bond Building Products Division.
 - b. United States Gypsum Co.

2. Gypsum Board and Related Products:
 - a. Georgia-Pacific Corp.
 - b. National Gypsum Co.; Gold Bond Building Products Division.
 - c. United States Gypsum Co.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work where proprietary gypsum wallboard is indicated include, but are not limited to, the following:

1. Firestop Type C; Georgia-Pacific Corp.
2. Fire-Shield G; National Gypsum Co.; Gold Bond Building Products Division.
3. Sheetrock Brand Gypsum Panels, FIRECODE C Core; United States Gypsum Co.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

- A. General: Provide components complying with ASTM C 754 for conditions indicated.
- B. Wire Ties: ASTM A 641, Class 1 zinc coating, soft temper, 0.062 inch thick.
- C. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- D. Hanger Rods: Mild steel and zinc coated or protected with rust-inhibitive paint.
- E. Flat Hangers: Mild steel and zinc coated or protected with rust-inhibitive paint.
- F. Channels: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch- wide flanges, and as follows:
 1. Carrying Channels: 1-1/2 inches deep, 475 lb/1000 feet, unless otherwise indicated.
 2. Furring Channels: 3/4 inch deep, 300 lb/1000 feet, unless otherwise indicated.
 3. Protective Coating: ASTM A 653, G 40 hot-dip galvanized coating for framing for exterior soffits and ceiling suspension members in areas within 10 feet of exterior walls.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

- A. General: Provide steel framing members complying with the following requirements:
 1. Protective Coating: ASTM A 653, G 40 hot-dip galvanized coating.
- B. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 0.0179 inch, unless otherwise indicated.
 2. Thickness: 0.0329 inch as follows:
 - a. For head runner, sill runner, jamb, and cripple studs at door and other openings.
 - b. In locations to receive cementitious backer units.
 - c. Where indicated.
 3. Thickness: As indicated.
 4. Depth: 3-5/8 inches, unless otherwise indicated.
- C. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth and minimum thickness of base (uncoated) metal as follows:
1. Thickness: 0.0179 inch, unless otherwise indicated.
 2. Depth: As indicated.
- D. Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated) metal of 0.0329 inch, designed for screw attachment to steel studs and steel rigid furring channels used for furring.
- E. Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568 to form 1/2-inch- deep channel of the following configuration:
1. Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- wide face connected to flanges by double-slotted or expanded-metal legs (webs).
- F. Z-Furring Members: Manufacturer's standard Z-shaped furring members with slotted or nonslotted web, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568; with a minimum base metal (uncoated) thickness of 0.0179 inch, face flange of 1-1/4 inch, wall-attachment flange of 7/8 inch, and of depth required to fit insulation thickness indicated.
- G. Steel Flat Strap and Backing Plate: Steel sheet for blocking and bracing complying with ASTM A 653 or ASTM A 568, length and width as indicated, and with a minimum base metal (uncoated) thickness as follows:
1. Thickness: 0.0179 inch, unless otherwise indicated.
- H. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.4 INTERIOR GYPSUM BOARD

- A. General: Glass mat, water-resistant interior wall panel. Coated inorganic glass mat faced, water-resistant, treated core gypsum wall board. Complying with ASTM C 1177 and ASTM C630 as applicable to type of gypsum board indicated and whichever is more stringent.
- B. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
 - 1. 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:
 - a. G-P Gypsum, DensArmor Plus, 5/8 type X.
 - b. National Gypsum Company.
 - c. USG Corporation.
- C. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.

2.5 EXTERIOR GYPSUM BOARD

- A. Exterior Gypsum Soffit and Sheathing Board: ASTM C 931/C 931M or ASTM C 1396/C 1396M, with manufacturer's standard edges.
 - 1. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum.
 - 2. Core: As indicated 5/8 inch, Type X.

2.6 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board:
 - 1. Complying with ASTM C 1178/C 1178M.
 - a. Product: Subject to compliance with requirements, provide "DensShield Tile Guard" by G-P Gypsum.
 - 2. Complying with ASTM C1177/C 1177M.
 - a. Product: Subject to compliance with requirements, provide "DensArmor Plus Interior Guard" by G-P Gypsum.
 - b. Core: 5/8 inch, Type X.

2.7 TRIM ACCESSORIES

- A. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:
1. Material: Formed metal or plastic, with metal complying with the following requirement:
 - a. Steel sheet zinc coated by hot-dip process or rolled zinc.
 2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:
 - a. Cornerbead on outside corners, unless otherwise indicated.
 - b. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
 - c. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
 - d. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.
 3. Provide Fry Reglet or equal architectural metal trim in conditions as follows:
 - a. At metal column covers – column collar
 - b. At drywall perpendicular to masonry wall – DRMZ-625-50
 - c. At concrete columns and ducts in drywall – Wall angle column ring
 - d. At acoustical tile to drywall in same plain – DRMAD-50-50
 - e. At acoustical tile to drywall perpendicular plain – 'W' acoustical reveal

2.8 JOINT TREATMENT MATERIALS

- A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
1. Joint Tape for Gypsum Board: pressure-sensitive or staple-attached, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.
- B. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
1. Ready-Mixed Formulation: Factory-mixed product.
 - a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
 - b. Topping compound formulated for fill (second) and finish (third) coats.
 - c. All-purpose compound formulated for both taping and topping compounds.

- d. All-purpose compound formulated for both taping and topping compounds.
- C. Joint Compound for Cementitious Backer Units: Material recommended by cementitious backer unit manufacturer.

2.9 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, non-hardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.
- B. Available Products: Subject to compliance with requirements, acoustical sealants that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.
 - b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
 - c. Sheetrock Acoustical Sealant; United States Gypsum Co.

2.10 MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
- B. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.
- C. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.
- D. Steel drill screws complying with ASTM C 1002 for the following applications:
 - 1. Fastening gypsum board to steel members less than 0.033 inch thick.
 - 2. Fastening gypsum board to gypsum board.
- E. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.
- F. Steel drill screws of size and type recommended by unit manufacturer for fastening cementitious backer units.
- G. Gypsum Board Nails: ASTM C 514.
- H. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

- I. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit metal stud size indicated.
- J. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing).
 1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.3 INSTALLING STEEL FRAMING, GENERAL

- A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."
- C. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.
- D. INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS
- E. Suspend ceiling hangers from building 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 structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
 3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
 4. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- F. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
1. Wire Hangers: 48 inches o.c.
 2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 24 inches o.c.
- G. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.
- H. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

3.4 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

- A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.
1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.
- B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. For fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.
- D. Terminate partition framing at suspended ceilings where indicated.
- E. Install steel studs and furring in sizes and at spacings indicated.
- F. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.
- G. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 1. Install 2 studs at each jamb, unless otherwise indicated.
 2. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.
- H. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

3.5 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

- A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.
- B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. 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.
- E. Locate both edge or 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. Avoid joints other than control joints at corners of framed openings where possible.

- F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Instead, float gypsum panels over these members using resilient channels or provide control joints to counteract wood shrinkage.
- I. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.
- J. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.
 - 1. Except where 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.
- K. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.
 - 1. Space screws a maximum of 12 inches o.c. for vertical applications.
- M. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.6 GYPSUM BOARD APPLICATION METHODS

- A. Single-Layer Application: Install gypsum wallboard panels as follows:
 - 1. On ceilings, apply gypsum panels prior to wall/partition board application to the 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, and provide panel lengths that will minimize end joints.
 3. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless parallel application is required for fire-resistance-rated assemblies. Use maximum-length panels to minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
 - b. At stairwells and other high walls, install panels horizontally.
 4. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- B. Multilayer Application on Partitions/Walls: Apply gypsum board indicated for base layers and gypsum wallboard 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. Stagger joints on opposite sides of partitions.
1. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
- C. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
1. Fasten with screws.
- D. Multilayer Fastening Methods: Apply base layers of gypsum panels and face Multi-layer Fastening Methods: Apply base layers of gypsum panels and face layer to base layers as follows:
1. Fasten both base layers and face layers separately to supports with screws.

3.7 INSTALLING TRIM ACCESSORIES

- A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
- B. Install cornerbead at external corners.
- C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
2. Install L-bead where edge trim can only be installed after gypsum panels are installed.

3.8 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.
- B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
- C. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.
- D. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.
- E. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
 1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
 2. Level 4 for gypsum board surfaces, unless otherwise indicated.
- F. Use the following joint compound combination as applicable to the finish levels specified:
 1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Sandable, setting-type joint compound.
- G. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
- H. Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply first coat of joint compound.
- I. Where Level 1 gypsum board finish is indicated, embed tape in joint compound.
- J. Finish water-resistant gypsum backing board to comply with ASTM C 840 and gypsum board manufacturer's directions for treatment of joints behind tile.

3.9 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Architect will conduct an above-ceiling observation prior to installation of gypsum board ceilings and report any 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 one week in advance of the date and the time when the Project, or part of the Project, will be ready for an above-ceiling observation.
 - 2. Prior to 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.

3.10 CLEANING AND PROTECTION

- A. Promptly remove any residual joint compound from adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09250

**SECTION 09265
GYPSUM BOARD SHAFT-WALL ASSEMBLIES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Shaft enclosures.
- B. Related Sections include the following:
 - 1. Division 9 " Gypsum Board Assemblies" for applying and finishing panels in gypsum board shaft-wall assemblies.

1.3 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board construction not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

- A. Product Data: For each gypsum board shaft-wall assembly indicated.
- B. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating.
- C. Research/Evaluation Reports: Evidence of compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction that substantiate required fire-resistance rating for each gypsum board shaft-wall assembly.
- D. Acoustical-Test-Response Reports: From a qualified independent testing agency substantiating required STC rating for each gypsum board shaft-wall assembly.

1.5 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory".
- B. STC-Rated Assemblies: For gypsum board shaft-wall assemblies indicated to have STC ratings, provide assembly materials and construction complying with requirements of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat on leveled supports off the ground to prevent sagging.

1.7 PROJECT CONDITIONS

- A. Comply with requirements for environmental conditions, room temperatures, and ventilation specified in Division 9 Section "Gypsum Board Assemblies."

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. G-P Gypsum Corp.
 - 2. National Gypsum Company.
 - 3. United States Gypsum Co.

2.2 ASSEMBLY MATERIALS

- A. General: Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
 - 1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
 - 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.
- B. Steel Framing: ASTM C 645.
 - 1. Protective Coating: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating.
- C. Gypsum Liner Panels: Manufacturer's proprietary liner panels in 1-inch thickness and with moisture-resistant paper faces.
- D. Gypsum Wallboard: ASTM C 36, core type as required by fire-resistance-rated assembly indicated.
 - 1. Edges: Tapered and featured (rounded or beveled) for prefilling.
- E. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 9 Section "" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- F. Gypsum Wallboard Joint-Treatment Materials: ASTM C 475 and as specified in Division 9 Section "Gypsum Board Assemblies."
- G. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- H. Track (Runner) Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
- I. Acoustical Sealant: As specified in Division 9 Section "Gypsum Board Assemblies."
- J. Sound Attenuation Blankets: ASTM C 665 for Type I, unfaced mineral-fiber-blanket insulation produced by combining thermosetting resins with mineral fibers manufactured from slag or rock wool.

2.3 GYPSUM BOARD SHAFT WALL

- A. Deflection Limit: L/360.
- B. Studs: Manufacturer's standard profile for repetitive members and corner and end members and for fire-resistance-rated assembly indicated.

1. Depth: As indicated.
 2. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.
- C. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches, in depth matching studs.
1. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.
- D. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.0341 inch thick.
- E. Room-Side Finish: As indicated.
- F. STC Rating: As indicated.
- G. Cavity Insulation: Sound attenuation blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Commencing installation of gypsum board shaftwall work items shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum shaft-wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft-wall assemblies to comply with requirements specified in Division 7 Section "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 gypsum board assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-

resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
 - 1. ASTM C 754 for installing steel framing.
 - 2. Division 9 Section " Gypsum Board Assemblies" for applying and finishing panels.
- B. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
- D. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.
- F. Install control joints to maintain fire-resistance rating of assemblies.
- G. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

END OF SECTION 09265

SECTION 09401 CEMENTITIOUS TERRAZZO

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Precast cementitious terrazzo.

1.3 SUBMITTALS

- A. Product Data: For each type of terrazzo and accessory indicated.
- B. Shop Drawings: Include terrazzo fabrication and installation requirements. Include plans, elevations, sections, component details, and attachments to other Work. Show layout of the following:
 - 1. Abrasive strips.
 - 2. Stair treads, risers, and landings.
 - 3. Precast terrazzo jointing and edge configurations.
- C. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the Work in size indicated below:
 - 1. Precast Terrazzo: 6-inch- square samples.
- D. Qualification Data: For Installer.
- E. Material Certificates: For each terrazzo type, signed by manufacturers.
- F. Maintenance Data: For each terrazzo type to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of aggregate from one source with resources to provide materials of consistent quality in appearance and physical properties.
- B. Mockups: Install mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Install terrazzo mockups of at least 100 sq. ft. of typical flooring, precast treads and platform conditions for each color and pattern in locations directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Preinstallation Conference: Review methods and procedures related to terrazzo including, but not limited to, the following:
 - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Maintain temperature above 50 deg F for 48 hours before and during terrazzo installation.

PART 2 - PRODUCTS

2.1 PRECAST CEMENTITIOUS TERRAZZO

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wausau Tile, Inc.; Terra Paving Products Division.
 - 2. Equal as approved by the Architect.

- B. Precast Terrazzo Units: Comply with NTMA's written recommendations for fabricating precast cementitious terrazzo units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer.
 - 1. Color and Pattern: Match Architect's sample.
 - 2. Stair Treads and Landings: Three-line abrasive inserts at nosings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

- A. Clean substrates to produce clean, dry, and neutral substrate for terrazzo application.

3.3 INSTALLATION, GENERAL

- A. Comply with NTMA's written recommendations for terrazzo and accessory installation.

3.4 PRECAST CEMENTITIOUS TERRAZZO INSTALLATION

- A. Install units using method recommended in writing by manufacturer unless otherwise indicated. Set units with alignment level and true to dimensions, varying 1/8 inch maximum in length, height, or width.
 - 1. Seal joints between units with cement grout matching precast terrazzo matrix.

3.5 CLEANING AND PROTECTING

- A. Seal surfaces according to NTMA's written recommendations. Apply sealer according to sealer manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION 09401

SECTION 09511 ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes ceilings consisting of acoustical panels and exposed suspension systems.

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
 - 1. Ceiling suspension system members.
 - 2. Method of attaching suspension system hangers to building structure.
 - 3. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
 - 4. Minimum Drawing Scale: 1/4 inch = 1 foot.
- C. Samples for Verification: Full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
 - 1. Full-size samples of each acoustical panel type, pattern, and color.
 - 2. Set of 12-inch- long samples of exposed suspension system members, including moldings, for each color and system type required.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

- B. Source Limitations for Ceiling Units: Obtain each acoustical ceiling panel from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. Source Limitations for Suspension System: Obtain each suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, 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.

1.7 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.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size units equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated below.

2.2 ACOUSTICAL PANELS

- A. Armstrong Acoustical Ceiling Panels, as per Finish Schedule on Drawing A-171.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard as per Finish Schedule on Drawing A-171.
- B. 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.
- C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Select wire diameter so its stress at three 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.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish 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.
3. For narrow-face suspension systems, provide suspension system and manufacturer's standard edge moldings that match width and configuration of exposed runners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and 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 other conditions affecting performance of acoustical panel ceilings.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.
- B. 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.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 1. Standard for Ceiling Suspension System Installations: Comply with manufacturer's specifications and ASTM C635 and C636.
- 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. Size

- supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
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; that are 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, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
 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; and provide hangers not more than 8 inches from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fitted 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 follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 3. 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 written instructions, unless otherwise indicated or required.

3.4 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 09511

SECTION 09651 RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Luxury Vinyl Tile.
 - 2. Rubber wall base and accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.
- C. Samples for Verification: Full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.
 - 1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches long, of each resilient accessory color and pattern specified.
- D. Maintenance Data: For resilient floor tile to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.
- C. Store tiles on flat surfaces.
- D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

- A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.
- B. Do not install products until they are at the same temperature as the space where they are to be installed. Provide Architect with moisture test reports complying with manufacturer required readings of subfloor.
- C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.
- D. Install tiles and accessories after other finishing operations, including painting, have been completed.
- E. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to:
 - 1. Luxury Vinyl Tile: as specified on Finish Schedule Drawing A-171 complying with ASTM F 1066 .
 - 2. Rubber Wall Base: as specified on Finish Schedule Drawing A-171 complying with FS SS-W-40, Type I.

All interior Floor Covering Materials shall comply with the requirements of the DOC FF-1 pill test (CSPC 16 CFR Part 1630) or ASTM D2859.

2.2 RESILIENT ACCESSORIES

- A. Rubber Wall Base: Products complying with FS SS-W-40, Type I and with requirements specified in the Finish Schedule Drawing A-171.
- B. Rubber Stair Treads: Products of style suitable for use indicated and complying with FS RR-T-650, Composition A.
- C. Vinyl Accessory Moldings: Products complying with requirements specified in the Finish Schedule Drawing A-171.

2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of tiles, and in maximum available lengths to minimize running joints
- D. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.
- 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, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion

and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.

2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.
 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Use stair-tread-nose filler, according to resilient tread manufacturer's written instructions, to fill nosing substrates that do not conform to tread contours.
- D. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- E. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.
- F. Apply self-leveling concrete underlayment at all floor conditions not meeting floor level criteria.

3.3 TILE INSTALLATION

- A. General: Comply with tile manufacturer's written installation instructions.
- B. Lay out 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 of a tile at perimeter.
 1. Lay tiles square with room axis, unless otherwise indicated.
- C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles with grain running in one direction.

- D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- 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 chalk or other nonpermanent, nonstaining marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's 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.
- I. Hand roll tiles according to tile manufacturer's written instructions.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. General: Install resilient accessories according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
 - 1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
 - 2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 - 3. Do not stretch base during installation.
 - 4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
 - 5. Install premolded outside and inside corners before installing straight pieces.
- C. Place resilient accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.
- D. Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions.

3.5 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing resilient products:
 - 1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
 - 2. Sweep or vacuum floor thoroughly.
 - 3. Do not wash floor until after time period recommended by flooring manufacturer.
 - 4. Damp-mop floor to remove marks and soil.

- B. Protect flooring against mars, marks, indentations, and other 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 flooring manufacturer.
 - 1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.
 - a. Use commercially available product acceptable to flooring manufacturer.
 - 2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
 - 3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

- C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.
 - 1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.
 - 2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations.

END OF SECTION 09651

**SECTION 09680
GLUE DOWN CARPETING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- B. This section includes the following:
 - 1. Carpet installed by the glue down fully adhered method.
 - 1) Carpet materials.
 - 2) Seam Sealer.
 - 3) Seaming.
 - 4) Anchorages.
 - 5) Edge treatment.
 - 6) Accessories.
 - 7) Installation and clean up.
- C. Related Sections include the following:
 - 1. Division 9 Section "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet.

1.3 JOB CONDITIONS

- A. Examine all surfaces to receive carpet. Examine new concrete slab to receive carpet. For renovation projects, examine existing surfaces before time of bid. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to installer and carpet manufacturer.
- B. Areas to receive carpet to be smooth and clean.
- C. Provide heat, light and power for effective working conditions.
- D. Provide unobstructed spaces for carpet installation. This includes removing and replacing any furniture or equipment in installation areas.

1.4 SUBMITTALS

- A. Submit three (3) each of the following to Architect for review prior to delivery and installation.
 - 1. Carpeting - 12" x 12" - each type
 - 2. Tackless strips - 6" long
 - 3. Literature and data sheets on adhesives.
 - 4. Underlayment - 12" x 12"
 - 5. Edgestrips - 6" long each color
- B. Shop drawings: Submit to Architect in accordance with the requirements of the Contract Documents, and include 1/8" scale plans of the areas which are scheduled to receive carpeting. Identify seam locations, special cut-out conditions and those areas where the carpet abuts other materials. Provide details of trim pieces and edge details at carpet termination.
- C. Before delivery of carpet, submit 3 certified copies of the reports of tests specified herein for flammability and static propensity. Testing shall have been performed by an Independent Testing Laboratory within two years of submittal of the report for approval. Test reports shall be accompanied by certificates from the manufacturer certifying that the material is of the same type, quality, manufacturer, and make as that tested.

Also, submit 3 copies of certificates from the manufacturer attesting that the carpet meets the requirements specified and that the installer and installation supervisor have the required experience.
- D. Before installation, submit the manufacturer's printed instructions for installation of the carpet. They shall include procedures for an expert installation giving preparation of substrate, and recommended adhesives and tapes.
- E. Submit 3 copies of the manufacturer's instructions for maintenance. Include recommended cleaning equipment and materials, spotting and cleaning methods and cleaning cycles.
- F. Maintenance Data: Provide the Owner with a manual which shall describe the care, cleaning and maintenance of the installed carpet.

1.5 QUALITY ASSURANCE

- A. Installer shall be a specialty contractor normally engaged in this work, having done satisfactory work of this type for a minimum of five years. The work shall be done by manufacturer's certified installers, working under a qualified supervisor.
- B. Manufacturer to submit in writing a report from a representative who has observed installation in the field with verification that installation is in accordance with manufacturer's instructions and recommendations.
- C. All products must be closed cell vinyl, cushion backed and in production for a minimum of ten (10) years from same manufacturer, no hard backed products will be accepted.

1.6 DELIVERY AND STORAGE

- A. Deliver carpet to the site in manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size and related information.
- B. Each roll shall have register number attached or stenciled on bale and intact.
- C. Store in a safe, dry, clean, and well-ventilated area, protected from damage, soiling and moisture. Store rolls flat, not on end.
- D. Where carpet is to be fabricated at a carpet workroom, keep receiving records and have carpet available for inspection by Architect.
- E. Do not open containers until needed for installation unless verification inspection is required.
- F. Take precautions to protect any existing construction finishes of the building against damage due to the carpeting operations. The contractor will be held responsible for the cost of any damage and to repair to the satisfaction of the Owner, at no additional cost.

1.7 WARRANTY

- A. Provide warranty agreeing to repair or replace unsatisfactory work due to defective materials or workmanship during times as listed below, without cost to Owner; and agreeing to repair or replace other defects not attributable to defective material or workmanship, as judged by Architect, at Owner's expense at prevailing rates. If carpeting fails, replacement at Owner's discretion.
- B. All warranties shall be of sole source responsibility. Warranties that involve more than one manufacturer, or company will not be allowed.
- C. All warranties shall be an official published warranty. Warranties issued on a job basis will not be allowed.
- D. All warranties shall be signed and notarized by an officer of the Corporation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Carpeting: Refer to Product Specification in Finish Schedule on Drawing A-171.

All interior Floor Covering Materials shall comply with the requirements of the DOC FF-1 pill test (CSPC 16 CFR Part 1630) or ASTM D2859.

Flammability Rating: Greater than 0.45 watts / cm² Flooring Radiant Panel, E-648, NFPA 253

1. Warranties: Lifetime Wear Guarantee
 2. Manufacturer: As per Finish Schedule on Drawing A-171.
- C. Adhesives for installation as recommended by the manufacturer of the carpet. Submit notarized certificates stating that the recommended adhesive is compatible with the carpet specified and the sub-strate, and that the adhesive will not affect the carpeting any way for the life of the installation.
- D. Edgestrips: solid vinyl conforming to approved profiles and shapes, colors selected by Architect and manufactured by Mercer Plastics co., or an acceptable equal.
- E. Latex Patching Material: Henry #335 and #336, Durabond Webpatch 90 or level-astic. Manufacturer of adhesive and finish material must approve patching material.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Study the contract drawings and specifications with regard to the work as shown and required under this section so as to insure its completeness.
- B. Examine surfaces and conditions to which this work is to be attached or applied, and notify the Architect if conditions or surfaces exist which are detrimental to the proper and expeditious installation of the work. Starting of the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
- C. Verify dimensions taken at the job site, affecting the work. Bring field dimensions which are at variance to the attention of the Architect.
- D. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

3.2 GENERAL

- A. Carpet installation shall constitute validation by the Contractor that the substrate and conditions in the area meet all requirements for satisfactory installation.
- B. Install carpet after the work of other trades, including painting, is substantially completed. Installed carpet shall be smooth, uniform, and secure. Accurately match patterned goods. Fit cutouts, such as door jambs, columns, and ducts, neatly and securely.
- C. Locate carpet joints and carpet seams at doorways parallel to and centered directly under doors. Do not locate joints or seams at doorways perpendicular to door or at pivot joints.
- D. Install wall to wall in rooms and areas indicated on the Finish Schedule. Include all material indicated, specified, and necessary for a complete finished installation.
- E. Be responsible for the required quantities of carpet. Check all dimensions in the field as well as other conditions affecting the work.
- F. Minimum floor temperature before, during, and after installation and requirements for conditioning adhesive, shall comply with the carpet and adhesive manufacturer's instructions. However, in no case shall floor temperature be less than 65° for 72 hours prior to, during, and after installation.

All materials should be stored in this temperature for at least 48 hours before commencing installation. This temperature should be maintained for 48 hours after installation. At no time should the temperature exceed 95° while installation is being made.

- G. Do not permit traffic or movement of furniture or equipment in carpeted areas for at least 24 hours after installation.

3.3 FLOOR PREPARATION:

- A. Inspect all rooms and areas to be carpeted. Before installation, test concrete floors for moisture content and hydrostatic pressure and take corrective measure if necessary. Excessive moisture is defined as no more than 2.5 pounds per sq. ft. Concrete should be tested for acidity/alkalinity and should test in to 6.0 to 8.0 range.
- B. Remove all excess concrete or debris adhering to the floor. Grind raised areas or ridges smooth and to a level surface. Floor shall be free of any wax, dirt, grease, paint or old adhesives (especially cut-back or emulsion). Previous residue of asphalt adhesive (cut-back or emulsion) must be removed by grinding with a concrete or terrazzo grinding machine and moist sand. Never use solvents. Apply latex sealer over remaining cut back at carpet areas only.

- C. Repair holes, cracks, depressions, or rough areas using materials recommended by carpet or adhesive manufacturer. Underlayments mixed with water are unacceptable.
- D. After patching and grinding, floor shall be swept or vacuumed clean to remove all grit. Oil based sweeping compounds should not be used.
- E. Apply self-leveling concrete underlayment at all floor conditions not meeting floor level criteria.

3.4 INSTALLATION:

- A. General:
 - 1. Comply with manufacturer's instructions and recommendations. Maintain direction of pattern and texture, including lay of pile as shown in accepted layout drawings. Arrows on back of material should be all going in the same direction.
 - 2. Run carpet in the same direction and install with a minimum number of seams as per the approved shop drawings. Install in each space using the minimum number of carpet sections except where indicated otherwise.
 - 3. Extend carpet under open bottomed and raised bottom obstructions, and under removable flanges of obstructions. Extend into closets and alcoves opening onto rooms to be carpeted, unless another floor finish is indicated for such spaces. Extend carpet under movable furniture and equipment.
 - 4. Provide cut-outs as indicated for removable access devices in substrate. Bind edges as neatly as possible and secure both sides of cut to the substrate. Cut only 3 sides where feasible to provide carpet flap in lieu fully-removable cutout.
 - 5. Provide cut-outs or running joints (as applicable) for removable access covers and similar required access through carpeting to substrate.
 - 6. Install carpet divider strips, with corners accurately mitered and tightly butted.
 - 7. Install carpet edge guard at locations where edge of carpet is exposed to traffic, except where another device, such as threshold, is indicated with integral carpet binder bar or edge guard. Anchor edge guard to substrate.
 - 8. Where seams relate to doors, center seams under door thickness. Do not place carpet seams in traffic direction in doorways.
 - 9. Provide special carpeting treatment as indicated at expansion joints in substrate or, if none is indicated, install carpeting with provisions to accommodate movement without damaging carpet installation.

10. Use skilled carpet layers who have been accepted by the approved carpet manufacturer and the Architect.
11. Make joints between carpet rolls in such a way so as to provide for exact alignment of fiber rows, texture and pattern from roll to roll. Sew all cross seams with approved type of waxed yarn, and install all other seams using the "hot melt tape" method.
12. Stretch carpet drum tight using stretchers and/or other mechanical aids to enable carpet to be laid in a proper and workmanlike manner.

Use sufficient concrete nails to hold stretch while seaming and for temporary anchoring. Mark locations and remove nails as each area of work is completed.

13. Cut carpet along walls, closely around projections, and to and through thresholds at doorways and other openings, taking care to align tuft rows, texture and pattern between pieces. Treat cut edges with sealer and neatly trim.
14. Filler strips where permitted shall not be less than 9" in width and at least 36" in length.
15. Where carpet abuts other floor materials, furnish and install continuous vinyl edge members in as long lengths as practical, in a secure and rigid manner.
16. Installed carpeting shall be smooth, free from ripples, bulges, puckers and uneven surfaces. Recommended procedures for installation shall be furnished in each roll. Remove portions of carpeting which are different from the approved samples as directed by the Architect.

B. Direct Glue Down Method

1. Cut two (2) pieces of carpet to length, plus trim and lay in place, forming a seam by the method recommended by the carpet manufacturer and snap a chalk line to make seam location. Turn each piece back approximately three (3) feet from the seam and spread adhesive uniformly for two (2) feet to each side of chalk line.
2. Unroll one (1) piece of carpet into adhesive. Brush out air bubbles toward the seam. Unroll the second piece toward the seam and work its cut edge into adhesive to pick up sufficient adhesive to "butter" the seam. Brush out any air bubbles in second place toward seam.
3. Roll up uncemented portion of first piece toward the seam, apply adhesive and unroll the carpet into the adhesive. Brush out any air bubbles away from the seam. Do likewise with the second piece but omit the adhesive for two (2) feet from the uncemented edge where the next seam will occur. Cut off excess carpet. Cut length of carpet and lay in place. Repeat installation procedure.

4. Back sew or heat bond cross seams as per manufacturer's recommendations and joined pieces treated as one. Continuous lengths and as broad widths as possible shall be used.
5. At columns and other projections, cut the carpet with maximum possible overage. Position the seams made by these cuts first. Fit closely and evenly to and through thresholds where carpet joins together at doorways and other openings, taking care to align tuft rows, texture and pattern between pieces.

3.5 CLEAN-UP AND PROTECTION

- A. Upon completion of the work, remove all waste, excess materials, tools and equipment from the job site. Remove all loose treads.
- B. Prior to acceptance of the installation, carpet portions which are damaged, stained, discolored, torn, ripped or otherwise not acceptable shall be repaired and/or replaced with new material of same dye batch.
- C. Vacuum clean the installed carpet with an upright type bar type beater vacuum cleaner.
- D. Usable pieces (approximately one square yard and larger) of carpet not required to complete the work shall be left on the job site and shall be placed in an orderly manner in an area designated by the Architect.
- E. Protect installed carpeting from damage by other trades. Install and maintain protective materials over traffic areas, and if necessary, close off areas to traffic.
- F. After the installation is completed, the carpet manufacturer shall provide one of his representatives to thoroughly instruct the Owner's maintenance personnel in the care, cleaning and maintenance of the installed carpet.
 1. Remove debris from installation, carefully sorting pieces to be saved from scraps to be disposed of. Carpet scraps are to be disposed of in polyethylene bags for recycling by carpet manufacturer.
 2. Vacuum carpet with a commercial machine, with rotating agitator or beater in nozzle. Remove spots, and replace tile where spots cannot be removed.
 3. Protect carpet with non-staining covering during remainder of the construction period, so that it will be in undamaged and unsoiled condition at time of project completion.

END OF SECTION 09680

SECTION 09900 PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
1. Exposed exterior items and surfaces.
 2. Exposed interior items and surfaces.
 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
1. Prefinished items include the following factory-finished components:
 - a. Elevator equipment.
 - b. Finished mechanical and electrical equipment.
 - c. Light fixtures.
 - d. Distribution cabinets.
 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.

- d. Pipe spaces.
 - e. Duct shafts.
 - f. Elevator shafts.
3. Finished metal surfaces include the following:
- a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper.
 - e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
- a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Sections include the following:
- 1. "Structural Steel" for shop priming structural steel.
 - 2. "Metal Fabrications" for shop priming ferrous metal.
 - 3. Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.
 - 4. Division 9 Section "Gypsum Board Assemblies" for surface preparation for gypsum board.
 - 5. Divisions 15 and 16: Painting of mechanical and electrical work is specified in Divisions 15 and 16, respectively.
- E. Alternates: Refer to Division 1 Section "Alternates" for description of Work in this Section affected by alternates.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
- 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
 - 3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.

4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.4 SUBMITTALS

- A. Product Data: For each paint system specified. Include block fillers and primers.
 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
 3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
 1. After color selection, the Architect will furnish color chips for surfaces to be coated.
- C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
 3. Submit Samples on the following substrates for the Architect's review of color and texture only:
 - a. Concrete: Provide two 4-inch- square samples for each color and finish.
 - b. Concrete Masonry: Provide two 4-by-8-inch samples of masonry, with mortar joint in the center, for each finish and color.
 - c. Painted Wood: Provide two 12-inch- square samples of each color and material on hardboard.
 - d. Stained or Natural Wood: Provide two 4-by-8-inch samples of natural- or stained-wood finish on actual wood surfaces.
 - e. Ferrous Metal: Provide two 4-inch- square samples of flat metal and two 8-inch- long samples of solid metal for each color and finish.
- D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed pro-

jects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
 - 1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a. Wall Surfaces: Provide samples on at least 100 sq. ft.
 - b. Small Areas and Items: Architect will designate items or areas required.
 - 2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 - 3. Repaint individual areas which are not accepted by the Architect with up to three additional color samples.
 - a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.
 - 4. Final approval of colors will be from benchmark samples.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.

- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.
- B. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:

Refer to Finish Schedule on A-171.

- 1. Devoe & Reynolds Co. (Devoe).
- 2. Fuller-O'Brien Paints (Fuller).
- 3. Glidden Co. (Glidden).
- 4. Benjamin Moore & Co. (Moore).
- 5. PPG Industries, Inc. (PPG).
- 6. Pratt & Lambert, Inc. (P & L).
- 7. Sherwin-Williams Co. (S-W).

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: Provide color selections made by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Materials: Prepare concrete, concrete masonry units, cement plaster, and surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
 - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
 - c. When transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign

substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

- a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pre-treatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. 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.
- F. EXISTING SURFACES:
1. As some existing coatings or sub-coatings may contain lead, specific attention is directed to 29 CFR 1926.62 Lead in Construction, worker protection rule.
 2. The Contractor shall provide suitable area and grounds protection to prevent the migration of any paint dusts, chips or other particulate matter generated during the course of surface preparation activities.
 3. At no time shall surface preparation debris, (paint chips) be commingled with standard waste materials.
 4. All waste material generated as a result of surface preparation shall be collected by the close of each work shift and stored in a suitable container at a secure location on the job site.
 5. All waste material generated as a result of surface preparation shall be collected and disposed of separately in accordance to the relevant waste classifi-

cation for said waste. The contractor shall provide waste classification data to the owner prior to the disposal of said waste, and waste manifests upon receipt.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer on metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 - 1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 - 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 - 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
 - 1. Piping, pipe hangers, and supports.
 - 2. Heat exchangers.
 - 3. Tanks.
 - 4. Ductwork.
 - 5. Insulation.
 - 6. Motors and mechanical equipment.
 - 7. Accessory items.
- G. Electrical items to be painted include, but are not limited to, the following:
 - 1. Conduit and fittings.
 - 2. Switchgear.
 - 3. Panelboards.
- H. Block Fillers: Apply block fillers to concrete masonry units at a rate to ensure complete coverage with pores filled.
- I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque 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.

- K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats.
- L. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.
 - 1. The Architect may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

3.4 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR PAINT SCHEDULE

- A. Concrete, Stucco, and Masonry (Other than Concrete Masonry Units): Provide the following finish systems over exterior concrete, stucco, and brick masonry surfaces:

1. Low-Luster Acrylic Finish: 2 finish coats over a primer.
 - a. Primer: Alkali-resistant, exterior, acrylic-latex primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.
 - 1) Devoe: 1502 Wonder-Shield Exterior Acrylic Latex House Paint Primer.
 - 2) Fuller: 220-17 Pigmented Concrete and Masonry Primer Sealer.
 - 3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint thinned with one-half pint of water per 1 gal..
 - 4) Moore: Moore's Latex Exterior Primer #102.
 - 5) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
 - 6) P & L: Z/F 1001 Suprime "1" Multi-Purpose 100 Percent Acrylic Primer.
 - b. First and Second Coats: Low-luster (eggshell or satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.3 mils.
 - 1) Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
 - 2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
 - 3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
 - 4) Moore: MoorGard Latex House Paint #103.
 - 5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
 - 6) P & L: Z/F 1800 Series Aqua-Shell Exterior Latex Eggshell Paint.
2. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.
 - a. Primer: Alkali-resistant, exterior, acrylic-latex primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.4 mils.
 - 1) Devoe: 1502 Wonder-Shield Exterior Latex House Paint Primer.
 - 2) Fuller: 220-17 Acrylic Concrete and Masonry Primer Sealer.
 - 3) Glidden: Primer not required over this substrate.
 - 4) Moore: Moore's Latex Exterior Primer #102.
 - 5) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
 - 6) P & L: Z/F 1001 Suprime "1" Multi-Purpose 100 Percent Acrylic Primer.
 - b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.

- 1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
 - 2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
 - 3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
 - 4) Moore: MoorGlo Latex House & Trim Paint #096.
 - 5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
 - 6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.
3. Low-Luster Acrylic Finish: 2 finish coats over a primer.
- a. Primer: Exterior, alkyd or latex, wood primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
 - 1) Devoe: 1102 All-Weather Exterior Alkyd House Paint Primer.
 - 2) Fuller: 220-08 Exterior Latex Wood Primer.
 - 3) Glidden: UH 450 Ultra-Hide Oil/Alkyd Exterior Primer.
 - 4) Moore: Moorwhite Primer #100.
 - 5) PPG: 1-70 or 1-870 Sun-Proof Exterior Wood Primer.
 - 6) P & L: S/D 1002 Suprime "2" Exterior Latex Wood Primer.
 - b. First and Second Coats: Low-sheen (eggshell or satin), exterior, latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.3 mils.
 - 1) Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
 - 2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
 - 3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
 - 4) Moore: MoorGard Latex House Paint #103.
 - 5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
 - 6) P & L: Z/F 1800 Series Aqua-Shell Exterior Latex Eggshell Paint.
4. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.
- a. Primer: Exterior, alkyd or latex, wood primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
 - 1) Devoe: 1102 All-Weather Exterior Alkyd House Paint Primer.
 - 2) Fuller: 220-08 Exterior Latex Wood Primer.
 - 3) Glidden: UH 450 Ultra-Hide Oil/Alkyd Exterior Primer.
 - 4) Moore: Moorwhite Primer #100.

- 5) PPG: 72-1 Sun-Proof Exterior House & Trim Wood Primer Flat--Latex.
 - 6) P & L: S/D 1002 Suprime "2" Exterior Latex Wood Primer.
- b. First and Second Coats: Semigloss, waterborne, exterior, acrylic enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.
- 1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
 - 2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
 - 3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
 - 4) Moore: MoorGlo Latex House & Trim Paint #096.
 - 5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
 - 6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.
5. Full-Gloss, Alkyd-Enamel Finish: 2 finish coats over a primer.
- a. Primer: Exterior, alkyd primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
- 1) Moore: Moorwhite Deep Color Base #100-04.
- b. First and Second Coats: exterior, alkyd enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 3.2 mils.
- 1) Devoe: 155 All-Weather Exterior Alkyd Gloss House and Trim Paint.
 - 2) Fuller: 660-XX Weather King Alkyd House & Trim Paint.
 - 3) Glidden: 1901 Series Spred House Dura-Gloss Oil House & Trim Paint.
 - 4) Moore: Moore's House Paint #110.
 - 5) PPG: 1 Line Sun-Proof Exterior Gloss-Oil House & Trim Paints.
 - 6) P & L: S/D 4900 Series Permalize Alkyd Gloss House and Trim Finish.
 - 7) S-W: SWP Exterior Gloss Finish A-2 Series.
- B. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.
1. Full-Gloss, Alkyd-Enamel Finish: 2 finish coats over a rust-inhibitive primer.
 - a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

- 1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
 - 2) Fuller: 621-04 Blox-Rust Alkyd Metal Primer.
 - 3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
 - 4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
 - 5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
 - 6) P & L: S 4551 Tech-Gard High Performance Rust-Inhibitor Primer.
 - 7) S-W: Kem Kromik Metal Primer B50N2/B50W1.
- b. First and Second Coats: Full-gloss, exterior, alkyd enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 3.0 mils.
- 1) Devoe: 70XX Mirrolac Interior/Exterior Alkyd-Urethane Gloss Enamel.
 - 2) Fuller: 312-XX Heavy-Duty Industrial Maintenance Enamel.
 - 3) Glidden: 4500 Series Glid-Guard Alkyd Industrial Enamel.
 - 4) Moore: Impervo Enamel #133.
 - 5) PPG: 6-282 Speedhide Interior/Exterior Gloss-Oil Enamel.
 - 6) P & L: S 4500 Series Tech-Gard Maintenance Gloss Enamel.
 - 7) S-W: Industrial Enamel B-54 Series.
- C. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:
1. Low-Luster Finish: 2 finish coats over a galvanized metal primer.
 - a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Devoe: 8502/8520 Mirrolac Interior/Exterior Waterborne Flat DTM Primer and Finish.
 - 2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
 - 3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
 - 4) Moore: IronClad Galvanized Metal Latex Primer #155.
 - 5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
 - 6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.
 - b. First and Second Coat: Low-luster (eggshell or satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.
 - 1) Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
 - 2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
 - 3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.

- 4) Moore: MoorGard Latex House Paint #103.
- 5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
- 6) P & L: Z/F 4200 Series Accolade Exterior Eggshell.

3.7 INTERIOR PAINT SCHEDULE

- A. Concrete Floors: Provide the following finish system over exposed concrete floors as noted on the drawings.
 1. Transparent curing, sealing and dustproofing: Sonneborn, Kure-N-Seal, 2 finish coats.
- B. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry units:
 1. Semigloss, Alkyd-Enamel Finish: 2 finish coats over an undercoat and a filled surface.
 - a. Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 5.0 mils.
 - 1) Devoe: 52902 Bloxfil 200 Interior/Exterior Latex Block Filler.
 - 2) Fuller: 280-00 Interior/Exterior Latex Block Filler.
 - 3) Glidden: 5317 Ultra-Hide Block Filler, Latex Interior-Exterior.
 - 4) Moore: Moorecraft Interior & Exterior Block Filler #173.
 - 5) PPG: 6-7 Speedhide Interior/Exterior Masonry Latex Block Filler.
 - 6) P & L: Z 98 Pro-Hide Plus Latex Block Filler.
 - 7) S-W: Heavy-Duty Block Filler B42W46.
 - b. Undercoat: Interior, alkyd- or latex-based, enamel undercoater, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
 - 2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
 - 3) Glidden: UH 400 Ultra-Hide Alkyd Interior Enamel Undercoater.
 - 4) Moore: Moore's Alkyd Enamel Underbody #217.
 - 5) PPG: 6-855 Speedhide Interior Latex Enamel Undercoater.
 - 6) P & L: S/D 1012 Suprime "12" Interior Alkyd Wall Primer.
 - 7) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.
 - c. Finish Coat: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
 - 1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.

- 2) Fuller: 206-XX Interior Alkyd Semi-Gloss Enamel.
 - 3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
 - 4) Moore: Satin Impervo #235.
 - 5) PPG: 27 Line Wallhide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil.
 - 6) P & L: S/D 5700 Series Cellu-Tone Alkyd Satin Enamel.
 - 7) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.
- C. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units located in the Basement Storage Room 000:
1. Gloss, Acrylic Epoxy 2 finish coats over a primer.
 - a. Primer: Moore M88 Latex Block Filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 8.0 mils.
 - b. First and Second Coats: Acrylic epoxy gloss coating applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
- D. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
1. Low-Luster, Acrylic-Enamel Finish: 2 finish coats over a primer.
 - a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Devoe: 50801 Wonder-Tones Interior Vinyl Latex Primer-Sealer.
 - 2) Fuller: 220-20 Pro-Tech Interior Latex Wall Primer and Sealer.
 - 3) Glidden: 5111 Spred Ultra Latex Primer-Sealer.
 - 4) Moore: Regal First Coat Interior Latex Primer & Underbody #216.
 - 5) PPG: 17-10 Quick-Drying Interior Latex Primer-Sealer.
 - 6) P & L: Z/F 1004 Suprime "4" Interior Latex Wall Primer.
 - b. First and Second Coats: Low-luster (eggshell or satin), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.
 - 1) Devoe: 34XX Wonder-Tones Interior Latex Eggshell Enamel.
 - 2) Fuller: 212-XX AA Enamel Acrylic Latex Eggshell Enamel.
 - 3) Glidden: 4100 Series Spred Ultra Eggshell Latex Wall & Trim Paint.
 - 4) Moore: Moore's Regal AquaVelvet #319.
 - 5) PPG: 89 Line Manor Hall Eggshell Latex Wall and Trim Enamel.
 - 6) P & L: Z/F 4000 Series Accolade Interior Velvet.

E. Woodwork and Hardboard: Provide the following paint finish systems over new, interior wood surfaces:

1. Semigloss, Alkyd-Enamel Finish: 2 finish coats over a primer.
 - a. Primer: Alkyd or latex-based, interior enamel undercoater applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Devoe: 51701 Wonder-Prime All-Purpose Latex Primer Sealer & Vapor Barrier.
 - 2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
 - 3) Glidden: UH 400 Ultra-Hide Alkyd Interior Enamel Undercoater.
 - 4) Moore: Moore's Alkyd Enamel Underbody #217.
 - 5) PPG: 17-255 Quick-Drying Enamel Undercoater.
 - 6) P & L: S/D 1011 Suprime "11" Interior Alkyd Wood Primer.
 - 7) S-W: ProMar 200 Alkyd Enamel Undercoater B49W200.
 - b. First and Second Coats: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.
 - 1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
 - 2) Fuller: 110-XX Fullerglo Alkyd Semi-Gloss Enamel.
 - 3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
 - 4) Moore: Satin Impervo #235.
 - 5) PPG: 27 Line Wallhide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil.
 - 6) P & L: S/D 5700 Cellu-Tone Alkyd Satin Enamel.
 - 7) S-W: Classic 99 Interior Alkyd Semi-Gloss Enamel A-40 Series.

F. Stained Wood: Provide the following stained finishes over interior wood:

1. Alkyd-Based, Satin-Varnish Finish: 2 finish coats of an alkyd-based, clear-satin varnish over a sealer coat and an alkyd-based, interior wood stain. Wipe wood filler before applying stain.
 - a. Filler Coat: Paste-wood filler applied at spreading rate recommended by the manufacturer.
 - 1) Devoe: None required.
 - 2) Fuller: 680-00 Pen-Chrome Paste Wood Filler.
 - 3) Glidden: Glidden Paste Wood Filler.
 - 4) Moore: Benwood Paste Wood Filler #238.
 - 5) PPG: None required.
 - 6) P & L: None required.
 - 7) S-W: Sher-Wood Fast-Dry Filler.
 - b. Stain Coat: Alkyd-based, interior wood stain applied at spreading rate recommended by the manufacturer.

- 1) Devoe: 96XX WoodWorks Alkyd Interior Stain.
 - 2) Fuller: 640-XX Pen-Chrome Interior Oil Base Wood Stain.
 - 3) Glidden: 1600 Series Woodmaster Oil Wood Stain.
 - 4) Moore: Benwood Penetrating Stain #234.
 - 5) PPG: 77-302 Rez Interior Semi-Transparent Stain.
 - 6) P & L: S-Series Tonetic Wood Stain.
 - 7) S-W: Oil Stain A-48 Series.
- c. Sealer Coat: Clear sanding sealer applied at spreading rate recommended by the manufacturer.
- 1) Devoe: 4900 WoodWorks Quick-Dry Clear Sealer.
 - 2) Fuller: None recommended.
 - 3) Glidden: 5035 Ultra-Hide Quick-Dry Sanding Sealer, Clear.
 - 4) Moore: Moore's Interior Wood Finishes Quick-Dry Sanding Sealer #413.
 - 5) PPG: 77-30 Rez Interior Quick-Drying Sealer and Finish.
 - 6) P & L: H-40 Sanding Sealer.
 - 7) S-W: ProMar Varnish Sanding Sealer B26V3.
- d. First and Second Finish Coats: Alkyd-based or polyurethane varnish, as recommended by the manufacturer, applied at spreading rate recommended by the manufacturer.
- 1) Devoe: 4600 WoodWorks Alkyd Satin Varnish.
 - 2) Fuller: 653-01 EPA Compliant Clear Polyurethane Satin Finish.
 - 3) Glidden: 82 Satin Sheen Woodmaster Polyurethane Clear Finishes Varnish.
 - 4) Moore: Benwood Satin Finish Varnish #404.
 - 5) PPG: 77-7 Rez Varnish, Interior Satin Oil Clear.
 - 6) P & L: H24 38 Clear Finish Gloss.
 - 7) S-W: Oil Base Varnish, Gloss A66V91.
- G. Natural-Finish Woodwork: Provide the following natural finishes over new, interior woodwork:
1. Alkyd-Based, Satin-Varnish Finish: 2 finish coats of an alkyd-based, clear-satin varnish over a sanding sealer. Provide wood filler on open-grain wood before applying first varnish coat.
 - a. Filler Coat: Paste-wood filler applied at spreading rate recommended by the manufacturer.
 - 1) Devoe: None required.
 - 2) Fuller: 680-00 Pen-Chrome Paste Wood Filler.
 - 3) Glidden: Glidden Paste Wood Filler.
 - 4) Moore: Benwood Paste Wood Filler #238.
 - 5) PPG: None required.
 - 6) P & L: None required.

- 7) S-W: Sher-Wood Fast-Dry Filler.
 - b. Sealer Coat: Clear sanding sealer applied at spreading rate recommended by the manufacturer.
 - 1) Devoe: 4900 WoodWorks Quick-Dry Clear Sealer.
 - 2) Fuller: None recommended.
 - 3) Glidden: 5035 Ultra-Hide Quick-Dry Sanding Sealer, Clear.
 - 4) Moore: Moore's Interior Wood Finishes Quick-Dry Sanding Sealer #413.
 - 5) PPG: 77-30 Rez Interior Quick-Drying Sealer and Finish.
 - 6) P & L: H-40 Sanding Sealer.
 - 7) S-W: ProMar Varnish Sanding Sealer B26V3.
 - c. First and Second Finish Coats: Alkyd-based or polyurethane varnish, as recommended by the manufacturer, applied at spreading rate recommended by the manufacturer.
 - 1) Devoe: 4600 WoodWorks Alkyd Satin Varnish.
 - 2) Fuller: 653-01 EPA Compliant Clear Polyurethane Satin Finish.
 - 3) Glidden: 82 Satin Sheen Woodmaster Polyurethane Clear Finishes Varnish.
 - 4) Moore: Benwood Satin Finish Varnish #404.
 - 5) PPG: 77-7 Rez Varnish, Interior Satin Oil Clear.
 - 6) P & L: H24 38 Clear Finish Gloss.
 - 7) S-W: Oil Base Varnish, Gloss A66V91.
- H. Ferrous Metal: Provide the following finish systems over ferrous metal:
1. Semigloss, Alkyd-Enamel Finish: One finish coat over an enamel undercoater and a primer.
 - a. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
 - 1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
 - 2) Fuller: 621-04 Blox-Rust Alkyd Metal Primer.
 - 3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
 - 4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
 - 5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
 - 6) P & L: S 4551 Tech-Gard High Performance Rust Inhibitor Primer.
 - 7) S-W: Kem Kromik Metal Primer B50N2/B50W1.
 - b. Undercoat: Alkyd, interior enamel undercoat or semigloss, interior, alkyd-enamel finish coat, as recommended by the manufacturer for this

substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

- 1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
- 2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
- 3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
- 4) Moore: Moore's Alkyd Enamel Underbody #217.
- 5) PPG: 6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
- 6) P & L: S/D 1011 Suprime "11" Interior Alkyd Wood Primer.
- 7) S-W: ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200.

- c. Finish Coat: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.4 mils.

- 1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
- 2) Fuller: 110-XX Fullerglo Alkyd Semi-Gloss Enamel.
- 3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
- 4) Moore: Satin Impervo #235.
- 5) PPG: 27 Line Wallhide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil.
- 6) P & L: S/D 5700 Cellu-Tone Alkyd Satin Enamel.
- 7) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.

- I. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal:

1. Semigloss, Alkyd-Enamel Finish: One finish coat over an undercoat and a primer.
 - a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Devoe: 13201 Mirrolac Galvanized Metal Primer.
 - 2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
 - 3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
 - 4) Moore: IronClad Galvanized Metal Latex Primer #155.
 - 5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
 - 6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.
 - 7) S-W: Galvite Paint B50W3.
 - b. Undercoat: Alkyd, interior enamel undercoat or semigloss, interior, alkyd-enamel finish coat, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
 - 2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.

- 3) Glidden: UH 8400 Series Spred Ultra Traditional Alkyd Semi-Gloss Enamel.
 - 4) Moore: Moore's Alkyd Enamel Underbody #217.
 - 5) PPG: 6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
 - 6) P & L: S/D 1011 Suprime "11" Interior Alkyd Wood Primer.
 - 7) S-W: ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200.
- c. Finish Coat: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.4 mils.
- 1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
 - 2) Fuller: 110-XX Fullerglo Alkyd Semi-Gloss Enamel.
 - 3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
 - 4) Moore: Satin Impervo #235.
 - 5) PPG: 27 Line Wallhide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil.
 - 6) P & L: S/D 5700 Cellu-Tone Alkyd Satin Enamel.
 - 7) S-W: Classic 99 Interior Alkyd Semi-Gloss Enamel A-40 Series.

3.8 SURFACE PREPARATION AND STEEL PAINTING SPECIFICATIONS

- A. All steel is to be prime painted and that is not spray fireproofed or galvanized:
- B. All steel to be painted, is to be cleared of all loose mill scale, rust, spatter, slag and flux deposit, oil, dirt, grease and other foreign matter using the following method of cleaning:
 1. Commercial sand blasting; SSPC-SP-6
 2. Hand tool cleaning; SSPC-SP-2
 3. Power tool cleaning
- C. All steel to be painted, except the walkway steel and wall bracing clips, shall be painted with a shop primer; TNEMEC No. 66 or No. 99 or approved equal. Cleaning shall be done after fabrication and immediately prior to shop painting. Apply shop paint within 8 hours after cleaning and before rust bloom occurs.
- D. Omit all shop paint within 2" of all field welds. After welding, properly prepare surface and prime paint as per the requirement for shop painting.
- E. All surfaces not shop painted shall be surface cleaned in the shop as specified above.
- F. The finish coat of paint on the steel is to be applied in the field, as per the general painting specification.
- G. All steel not to be painted, and to be spray fireproofed or galvanized is to be cleaned and surface prepared as per #2 above.

END OF SECTION 09900

SECTION 10521 FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes portable fire extinguishers and fire-protection cabinets. Provide fire extinguishers and cabinets every 75' in corridors and as indicated on drawings.
- B. See Division 7 Section "Through-Penetration Firestop Systems" for firestopping sealants at fire-rated cabinets.
- C. See Division 9 Section "Painting" for field-painting fire-protection cabinets.
- D. Division 15.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Cabinets: Include door hardware, cabinet type, trim style, panel style, and details of installation.
- B. Samples: For each exposed cabinet finish.

1.3 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1.4 COORDINATION

- A. Coordinate size of cabinets to ensure that type and capacity of hoses, hose valves, and hose racks indicated are accommodated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 366/A 366M carbon steel, commercial quality, stretcher leveled, temper rolled.
- B. Aluminum: ASTM B 209 (ASTM B 209M) sheet and ASTM B 221 (ASTM B 221M) extrusions, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
- C. Stainless-Steel Sheet: ASTM A 666/A 666M, Type 302 or Type 304 alloy.
- D. Copper-Alloy Sheet, Brass: ASTM B 36/B 36M, alloy UNS No. C26000 (cartridge brass, 70 percent copper).
- E. Copper-Alloy Sheet, Bronze: ASTM B 36/B 36M, alloy UNS No. C28000 (muntz metal, 60 percent copper).

2.2 PORTABLE FIRE EXTINGUISHERS

- 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:
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. J. L. Industries, Inc. Cosmic, Saturn
 - 2. or Architect approved equal
- C. For Kitchen Area only: Saturn: Wet Chemical 6 Liter Extinguisher as manufactured by J. L. Industries, Inc, for Class K Fires.
- D. General: Provide fire extinguishers for each cabinet and other locations indicated.
 - 1. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher indicated and with plated or baked-enamel finish.
 - a. Provide brackets for extinguishers located and not located in cabinets.
 - 2. Identification: Lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as directed by Architect.
 - a. Identify bracket-mounted extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to wall surface.

2.3 FIRE-PROTECTION CABINETS

- 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:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. J. L. Industries, Inc. #1835
 2. or Architect approved equal.
- C. Model by J. L. Industries, Inc. Ambassador 1015F10Fx with FIRE-FX option and FE Letters. To fit rough wall opening 12 1/2" W x 26 1/8" H x 6 3/8" D or Architect approved equal.
- D. Fire Protection Cabinet
 1. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
 - a. Fire-Rated Cabinets: Listed and labeled to meet requirements in ASTM E 814 for fire-resistance rating of wall where it is installed.
 - 1) Construct fire-rated cabinets with double walls fabricated from 0.0478-inch- (1.2-mm-) thick, cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick, fire-barrier material.
 - b. Cabinet Metal: Stainless-steel sheet.
 2. Cabinet Type: Suitable for fire extinguisher.
 3. Cabinet Mounting: Recessed
 4. Cabinet Trim Style: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.
 - a. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - 1) Flat Trim for Recessed Cabinets: 1/4- to 5/16-inch (6- to 8-mm) backbend depth.
 5. Cabinet Trim Material: Manufacturer's standard.
 6. Door Material: Manufacturer's standard (brushed steel or aluminum).
 7. Door Glazing: Manufacturer's standard, as follows:
 - a. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, Class 1 clear.
 8. Door Style: Manufacturer's standard design.
 9. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.

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- a. Provide minimum 1/2-inch- (13-mm-) thick door frames, fabricated with tubular stiles and rails, and hollow-metal design.
 - b. Provide inside latch and lock for break-glass panels.
10. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.
11. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as directed by Architect.
- a. Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER" applied to door.
 - 1) Application Process: Decals or Vinyl letters.
 - 2) Lettering Color: Red.
 - 3) Orientation: Vertical.

2.4 FINISHES

- A. Steel Cabinet and Door Finishes: Provide manufacturer's standard baked-enamel paint for the following:
 1. Exterior of cabinets and doors, except for those surfaces indicated to receive another finish.
 2. Interior of cabinets and doors.
- B. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- C. Steel, Factory Priming for Field-Painted Finish: Apply manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer shop primer immediately after surface preparation and pretreatment.
- D. Steel Baked-Enamel Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Minimum dry film thickness of 2 mils (0.05 mm).
 1. Color As selected from manufacturer's standard
- E. Stainless-Steel Surface Preparation: Remove or blend tool and die marks and stretch lines into finish. Grind and polish surfaces to produce uniform, directionally textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- F. Stainless-Steel Finish: Satin, directional polish, No. 6.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets are to be installed.
- B. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged units.
- C. 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 mounting brackets to structure and cabinets, square and plumb.
 - 3. Fasten cabinets to structure, square and plumb.
- D. Adjust cabinet doors that do not swing or operate freely.
- E. Refinish or replace cabinets and doors damaged during installation.

END OF SECTION 10520

SECTION 284621.11 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit.
 - 2. Manual fire-alarm boxes.
 - 3. System smoke detectors.
 - 4. Nonsystem smoke detectors.
 - 5. Heat detectors.
 - 6. Notification appliances.
 - 7. Device guards.
 - 8. Magnetic door holders.
 - 9. Remote annunciator.
 - 10. Addressable interface device.
 - 11. Digital alarm communicator transmitter.
 - 12. Carbon Monoxide Detectors

1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.
- F. VESDA: Very Early Smoke-Detection Apparatus.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, and electrical characteristics.
- B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 2. Include plans, elevations, sections, details, and attachments to other work.
 3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
 4. Detail assembly and support requirements.
 5. Include voltage drop calculations for notification-appliance circuits.
 6. Include battery-size calculations.
 7. Include input/output matrix.
 8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
 9. Include performance parameters and installation details for each detector.
 10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 11. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
 12. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
 - a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
 - b. Show field wiring required for HVAC unit shutdown on alarm.
 - c. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' control system.
 - d. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' smoke-evacuation system.
 - e. Locate detectors according to manufacturer's written recommendations.
 - f. Show air-sampling detector pipe routing.
 13. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 14. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.
- C. General Submittal Requirements:
1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician; Level III minimum.
 - c. Licensed or certified by authorities having jurisdiction.
- D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.

2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

1.6 Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
 - g. Record copy of site-specific software.
 - h. Provide AutoCAD-based record drawings showing installed device locations on floor plans.
 - i. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.

- 4) Requirements and recommendations related to results of maintenance.
- 5) Manufacturer's user training manuals.

- j. Manufacturer's required maintenance related to system warranty requirements.
- k. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
3. Smoke Detectors, Heat Detectors and Carbon Monoxide Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
5. Keys and Tools: One extra set for access to locked or tamperproofed components.
6. Audible and Visual Notification Appliances: Five of each type installed.
7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.
8. Filters for Air-Sampling Detectors: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
9. Air-Sampling Fan: Quantity equal to one for every five detectors, but no fewer than one unit of each type.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.
- C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).
- D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.10 PROJECT CONDITIONS

- A. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice/strobe evacuation.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be listed for use with the selected system.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Smoke detectors.
 - 4. Duct smoke detectors.
 - 5. Carbon monoxide detectors.
 - 6. Combustible gas detectors.
 - 7. Automatic sprinkler system water flow.
 - 8. Fire standpipe system.
 - 9. Dry system pressure flow switch.
 - 10. Fire pump running.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances.

2. Identify alarm and specific initiating device at fire-alarm control unit and remote annunciators.
 3. Transmit an alarm signal to the remote alarm receiving station.
 4. Unlock electric door locks in designated egress paths.
 5. Release fire and smoke doors held open by magnetic door holders.
 6. Activate voice/alarm communication system.
 7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
 8. Close smoke dampers in air ducts of designated air-conditioning duct systems.
 9. Recall elevators to primary or alternate recall floors.
 10. Activate elevator power shunt trip.
 11. Record events in the system memory.
 12. Indicate device in alarm on the graphic annunciator.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Valve supervisory switch.
 2. Elevator shunt-trip supervision.
 3. Fire pump running.
 4. Fire-pump loss of power.
 5. Fire-pump power phase reversal.
 6. Fire-pump connected to alternate power source.
 7. User disabling of zones or individual devices.
 8. Carbon monoxide detector.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, booster panel, extender panel, etc.
 4. Loss of primary power at fire-alarm control unit.
 5. Ground or a single break in internal circuits of fire-alarm control unit.
 6. Abnormal ac voltage at fire-alarm control unit.
 7. Break in standby battery circuitry.
 8. Failure of battery charging.
 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
 10. Voice signal amplifier failure.
- E. System Supervisory Signal Actions:
1. Identify specific device initiating the event at fire-alarm control unit and remote annunciators.
 2. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
Display system status on graphic annunciator.
- F. Elevator shaft or elevator machine room heat detector signal shall initiate the following actions in addition to the action indicated above:
1. Activate elevator shunt trip. There shall be a delay in the activation of the power shunt trip. This delay will be the time it takes the elevator to travel from the top of the hoist way to the lowest recall level.

- G. Signal from carbon monoxide detector shall initiate the following actions:
1. Initiate supervisory signal to system and records at the main panel and remote annunciator.
 2. Transmits a (supervisory) carbon monoxide signal to central station.
 3. Continuously operate sounder base associated with the carbon monoxide detector.
 4. Continuously operate carbon monoxide alarm audio/visual notification device at the Lobby 101 Reception area location.

2.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.4 FIRE-ALARM CONTROL UNIT

- 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. GAMEWELL.
 2. GE UTC Fire & Security; A United Technologies Company.
 3. Keltron Corporation.
 4. Mircom Technologies, Ltd.
 5. Notifier.
 6. Siemens Industry, Inc.; Fire Safety Division.
 7. SimplexGrinnell LP.
- B. General Requirements for Fire-Alarm Control Unit:
1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of

a complete power down condition. The FACP shall provide a minimum 500-event history log.

2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
 3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.
- C. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type, three line(s) of 80 characters, minimum.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.
- D. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
1. Pathway Class Designations: NFPA 72, Class B.
 2. Pathway Survivability: Level 1.
 3. Install no more than manufacturer's recommended quantity of addressable devices on each signaling-line circuit.
 4. Serial Interfaces:
 - a. One dedicated RS 485 port for central-station operation using point ID DACT.
 - b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
 - c. One RS 232 port for PC configuration.
 - d. One RS 232 port for VESDA HLI connection.
 - e. One RS 232 port for voice evacuation interface.
- E. Smoke-Alarm Verification:
1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
 3. Record events by the system printer.
 4. Sound general alarm if the alarm is verified.
 5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- F. Notification-Appliance Circuit:
1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
 2. CARBON MONOXIDE ALARM: Audible appliances shall sound in a four-pulse temporal pattern, as defined in NFPA 72, or a constant tone. Carbon monoxide alarm sound shall be different than the fire alarm sound.
 3. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.

4. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
- G. Elevator Recall:
1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:
 - a. Elevator lobby detectors except the lobby detector on the designated floor.
 - b. Smoke detector in elevator machine room.
 - c. Smoke detectors in elevator hoistway.
 2. Elevator controller shall be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.
 3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
 - a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.
- H. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.
- I. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.
- J. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- K. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided in a separate cabinet located in the fire command center or as a special module that is part of fire-alarm control unit.
1. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.
 - a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
 - b. Programmable tone and message sequence selection.
 - c. Standard digitally recorded messages for "Evacuation" and "All Clear."
 - d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit.
 2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
 3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

- L. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.
- M. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals shall be powered by 24-V dc source.
 - 1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- N. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - 1. Batteries: Sealed lead calcium.
- O. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.5 MANUAL FIRE-ALARM BOXES

- 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. Cooper Wheelock.
 - 2. GAMEWELL.
 - 3. GE UTC Fire & Security; A United Technologies Company.
 - 4. Keltron Corporation.
 - 5. Mircom Technologies, Ltd.
 - 6. Notifier.
 - 7. Siemens Industry, Inc.; Fire Safety Division.
 - 8. SimplexGrinnell LP.
 - 9. System Sensor.
- B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Single-action mechanism, breaking-glass or plastic-rod type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 2. Station Reset: Key- or wrench-operated switch.
 - 3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 - 4. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.6 SYSTEM SMOKE DETECTORS

- 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. Fenwal Protection Systems; A UTC Fire & Security Company.
 2. GAMEWELL.
 3. GE UTC Fire & Security; A United Technologies Company.
 4. Gentex Corporation.
 5. Keltron Corporation.
 6. Mircom Technologies, Ltd.
 7. Notifier.
 8. Siemens Industry, Inc.; Fire Safety Division.
 9. SimplexGrinnell LP.
 10. System Sensor.
- B. General Requirements for System Smoke Detectors:
1. Comply with UL 268; operating at 24-V dc, nominal.
 2. Detectors shall be two-wire type.
 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 6. Integral Visual-Indicating Light: LED type, indicating detector has operated.
 7. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
 - a. Rate-of-rise temperature characteristic of combination smoke- and heat-detection units shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
 - b. Fixed-temperature sensing characteristic of combination smoke- and heat-detection units shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
 - c. Multiple levels of detection sensitivity for each sensor.
 - d. Sensitivity levels based on time of day.
- C. Photoelectric Smoke Detectors:
1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
- D. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.7 CARBON MONOXIDE DETECTORS

- A. General: Carbon monoxide detector listed for connection to fire-alarm system.
 1. Mounting: Adapter plate for outlet box mounting.
 2. Testable by introducing test carbon monoxide into the sensing cell.
 3. Detector shall provide alarm contacts and trouble contacts.
 4. Detector shall send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
 5. Comply with UL 2075.
 6. Locate, mount, and wire according to manufacturer's written instructions.
 7. Provide means for addressable connection to fire-alarm system.
 8. Test button simulates an alarm condition.
 9. Provide with sounder bases for local audio annunciation.

2.8 NONSYSTEM MULTICRITERIA DETECTORS

- A. Mounting: Adapter plate for outlet box mounting.
- B. Test button tests all sensors in the detector.
- C. Comply with UL 217; suitable for NFPA 101, residential occupancies; operating at 120-V ac with 9-V dc battery as the secondary power source. Provide with "low" or "missing" battery chirping-sound device.
- D. Sensors: The detector shall be comprised of two sensing elements including a smoke sensor and a carbon monoxide sensor.
 1. Smoke sensor shall be photoelectric type as described in "System Smoke Detectors" Article.
 2. Carbon monoxide sensor shall be as described in "Carbon Monoxide Detectors" Article.
 3. Each sensor shall be separately listed according to requirements for its detector type.

2.9 NONSYSTEM SMOKE DETECTORS

A. General Requirements for Nonsystem Smoke Detectors:

1. Nonsystem smoke detectors shall be listed as compatible with the fire-alarm equipment installed or shall have a contact closure interface listed for the connected load.
2. Nonsystem smoke detectors shall meet the monitoring for integrity requirements in NFPA 72.

B. Single-Station Smoke Detectors:

1. Comply with UL 217; suitable for NFPA 101, residential occupancies; operating at 120-V ac with 9-V dc battery as the secondary power source. Provide with "low" or "missing" battery chirping-sound device.
2. Auxiliary Relays: One Form A and one Form C, both rated at 0.5 A.
3. Audible Notification Appliance: Piezoelectric sounder rated at 90 dBA at 10 feet (3 m) according to UL 464.
4. Visible Notification Appliance: 177-cd strobe.
5. Test Switch: Push to test; simulates smoke at rated obscuration.
6. Tandem Connection: Allow tandem connection of number of indicated detectors; alarm on one detector shall actuate notification on all connected detectors.
7. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
8. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
9. Integral Visual-Indicating Light: LED type, indicating detector has operated.

C. Single-Station Duct Smoke Detectors:

1. Comply with UL 268A; operating at 120-V ac.
2. Sensor: LED or infrared light source with matching silicon-cell receiver.
 - a. Detector Sensitivity: Smoke obscuration between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) when tested according to UL 268A.
3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. The fixed base shall be designed for mounting directly to air duct. Provide terminals in the fixed base for connection to building wiring.
 - a. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; listed for use with the supplied detector.
4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
5. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.10 MULTICRITERIA DETECTORS

A. Mounting: Twist-lock base interchangeable with smoke-detector bases.

B. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

- C. Automatically adjusts its sensitivity by means of drift compensation and smoothing algorithms. The detector shall send trouble alarm if it is incapable of compensating for existing conditions.
- D. Test button tests all sensors in the detector.
- E. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - 1. Primary status.
 - 2. Device type.
 - 3. Present sensitivity selected.
 - 4. Sensor range (normal, dirty, etc.).
- F. Sensors: The detector shall be comprised of four sensing elements including a smoke sensor, a carbon monoxide sensor, an infrared sensor, and a heat sensor.
 - 1. Smoke sensor shall be photoelectric type as described in "System Smoke Detectors" Article.
 - 2. Carbon monoxide sensor shall be as described in "Carbon Monoxide Detectors" Article.
 - 3. Heat sensor shall be as described in "Heat Detectors" Article.
 - 4. Each sensor shall be separately listed according to requirements for its detector type.

2.11 HEAT DETECTORS

- 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. GAMEWELL.
 - 2. GE UTC Fire & Security; A United Technologies Company.
 - 3. Keltron Corporation.
 - 4. Mircom Technologies, Ltd.
 - 5. Notifier.
 - 6. Siemens Industry, Inc.; Fire Safety Division.
 - 7. SimplexGrinnell LP.
 - 8. System Sensor.
- B. General Requirements for Heat Detectors: Comply with UL 521.
 - 1. Temperature sensors shall test for and communicate the sensitivity range of the device.
- C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).
 - 1. Mounting: Adapter plate for outlet box mounting.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.12 NOTIFICATION APPLIANCES

- 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. Cooper Wheelock.
 2. GE UTC Fire & Security; A United Technologies Company.
 3. Keltron Corporation.
 4. Mircom Technologies, Ltd.
 5. Siemens Industry, Inc.; Fire Safety Division.
 6. SimplexGrinnell LP.
 7. System Sensor.
- B. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
- C. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- D. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.
- E. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.
- F. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
- G. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 2. Mounting: Wall mounted unless otherwise indicated.
 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 4. Flashing shall be in a temporal pattern, synchronized with other units.
 5. Strobe Leads: Factory connected to screw terminals.
 6. Mounting Faceplate: Factory finished, red.
- H. Voice/Tone Notification Appliances:
1. Comply with UL 1480.
 2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.

3. High-Range Units: Rated 2 to 15 W.
4. Low-Range Units: Rated 1 to 2 W.
5. Mounting: Flush.
6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

I. Exit Marking Audible Notification Appliance:

1. Exit marking audible notification appliances shall meet the audibility requirements in NFPA 72.
2. Provide exit marking audible notification appliances at the entrance to all building exits.
3. Provide exit marking audible notification appliances at the entrance to areas of refuge with audible signals distinct from those used for building exit marking.

2.13 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnets: Require no more than 3 W to develop 25-lbf (111-N) holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or dc.
4. Rating: 120-V ac.

B. Material and Finish: Match door hardware.

2.14 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.15 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall to circuit-breaker shunt trip for power shutdown.

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

D. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.
3. As noted on drawings.

2.16 DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.
- B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.
- C. Local functions and display at the digital alarm communicator transmitter shall include the following:
 1. Verification that both telephone lines are available.
 2. Programming device.
 3. LED display.
 4. Manual test report function and manual transmission clear indication.
 5. Communications failure with the central station or fire-alarm control unit.
- D. Digital data transmission shall include the following:
 1. Address of the alarm-initiating device.
 2. Address of the supervisory signal.
 3. Address of the trouble-initiating device.
 4. Loss of ac supply.
 5. Loss of power.
 6. Low battery.
 7. Abnormal test signal.
 8. Communication bus failure.
- E. Secondary Power: Integral rechargeable battery and automatic charger.
- F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.
 - 1. Comply with requirements for seismic-restraint devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- C. Manual Fire-Alarm Boxes:
 - 1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
 - 2. Mount manual fire-alarm box on a background of a contrasting color.
 - 3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.
- D. Smoke- or Heat-Detector Spacing:
 - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 - 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 - 3. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A in NFPA 72.
 - 4. HVAC: Locate detectors not closer than **[36 inches (910 mm)] [60 inches (1520 mm)]** from air-supply diffuser or return-air opening.

5. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- E. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- F. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
 1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- G. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.
- H. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- I. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- J. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- K. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.
- L. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

- A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.
 1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.
- B. Pathways shall be installed in EMT.
- C. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.
 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.

- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
 - 2. Smoke dampers in air ducts of designated HVAC duct systems.
 - 3. Magnetically held-open doors.
 - 4. Alarm-initiating connection to elevator recall system and components.
 - 5. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
 - 6. Supervisory connections at valve supervisory switches.
 - 7. Supervisory connections at elevator shunt-trip breaker.
 - 8. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
 - 9. Supervisory connections at fire-pump engine control panel.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial

Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 28 31 11

500 Commerce St
Hawthorne, NY

Construction Documents