

SECTION 011000 – SUMMARY**PART 1 - GENERAL****1.1 SUMMARY****A. Work Covered by the Contract Documents:**

1. Project Identification: This project consists of additions and alterations to North White Plains Community Center as per attached plans and specifications.
 - a. Project Location: 10 Clove Road, White Plains, New York 10603
 - b. Owner: Town of North Castle, 15 Bedford Road, Armonk, New York 10504
2. Architect: Sullivan Architecture, PC, 31 Mamaroneck Ave., White Plains, NY 10601.

Owner-Furnished Products: Phone and data wiring. Contractor to provide base bid all conduit and back boxes with pull string. Contractor to provide labor in estimate to also pull a SDI cable for the owner, cable purchased by owner, scope to be determined.

1.2 INTENT

- A. These specifications with the accompanying drawings are intended to describe and illustrate all material, labor, and equipment necessary to complete the construction of a new fire and rescue substation.
- B. For convenience of reference, these specifications are separated into titled divisions and sections. Such separations shall not, however, operate to make the Architect or General Contractor an arbiter to establish limits to contracts between a Contractor and his subcontractors. The divisions of the specifications do not necessarily define the limits of the contractor's subcontracts; the work of any one subcontract may include items specified in several divisions or sections. The contractor may sublet work as he sees fit, but it is his responsibility to see that all work shown on the drawings and/or specifications is completed in accordance with the Contract.
- C. Furnish all materials and accomplish all work in strict accordance with the grades or standards of materials, standards of workmanship, and manufacturer's specifications listed or mentioned in these documents.
- D. The listing or mention of materials shall be sufficient indication that all such materials shall be furnished by the contract, in accordance with the grades or standards indicated, free from defects impairing strength, durability or appearance and in sufficient quantity for the proper and complete execution of the work, unless specifically stated otherwise.

- E. The listing or mention of any method of installation, erection, fabrication or workmanship shall not operate to make the contractor an agent, but shall be for the sole purpose of setting a standard of quality for the finished work. Contractor is free to use any alternate method, provided only that, prior to the start of the work, such alternate method is approved in writing by the architect, as resulting in quality equal to that intended by these documents. Unless an alternate method is approved, all work shall be in strict accordance with all methods of installation, erection, fabrication and workmanship listed or mentioned herein.

1.3 WORK SCHEDULE AND PHASING

- A. The Contractor may begin setting up exterior site areas as delineated in Construction Documents, as of TBD. These elements include a dumpster, trailer as needed, storage container or other exterior items as required. All must be located inside the area of disturbance line shown on site drawings.
- B. The Contractor may begin Construction Work upon notice to proceed by the owner. .
- C. The Work shall be substantially complete TBD calendar days after notice to proceed by the owner.

1.4 USE OF PREMISES

- A. Use of Site:
 - 1. Limits: Confine construction operations to areas within contract limits indicated. Do not disturb portions of the building beyond the areas in which the Work is indicated unless otherwise noted. Any damage outside the area of disturbance must be repaired and restored in accordance with construction documents.
 - 2. Driveways and Entrances: Keep construction entrances and driveways serving site clear and available for emergency vehicles at all times. Do not use these areas for parking or storage of materials, except as indicated in Construction Documents.
 - 3. Damages: Promptly repair and restore damages caused to site or adjacent facilities by Work of the Contract to a good-as-new condition acceptable to the Owner.
- B. Work Hours: Work hours at the project site is Monday to Friday from 7:30 AM to 5:00 PM or unless otherwise noted. All work shall be performed during these hours unless otherwise approved in advance by the Owner. Utility Shutdowns: Coordinate all utility shut downs and cross overs with the Owner.

1.5 OCCUPANCY REQUIREMENTS

- A. Architect will prepare a Certificate of Substantial Completion for the areas of Work to be occupied before Owner occupancy.

1. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.

1.6 SPECIAL PROJECT CONDITIONS - SAFETY

- A. Comply with general safety and security standards for construction projects as follows:
 1. Store all construction materials in a safe and secure manner.
 2. Provide and maintain fences around construction supplies or debris. Provide overhead protection during exterior renovation work, for any areas immediately beneath the work site, or fence off such areas and provide with warning signs to prevent entry. Maintain site and building security to prevent unauthorized access. **Coordinate security of building and site during off-hours with Todd Orłowski Superintendent of Recreation, (914) 273-3000 ext. 301 and email torlowski@orthcastleny.com.**
- B. Fire and Hazard Prevention:
 1. No smoking is allowed on property, including construction areas.
 2. During construction, daily inspections of occupied areas shall be conducted by the Contractor's personnel to assure that construction materials, equipment or debris do not block fire exits.
 3. General Contractor to provide fire extinguishers for construction operations.
- C. General Contractor to Control Chemical Fumes, Gases, and Other Contaminants during Construction Project: Control exhaust fumes from welding, gasoline engines, roofing, painting, VOC fumes, or other fumes to assure they do not present hazards to on site workers.
 1. General Contractor to keep schedule, cure or ventilate materials and activities to allow for "off-gassing" of volatile organic compounds introduced during construction before occupancy of spaces. Specific attention is warranted for materials and activities including, but not limited to: glues, paint and carpeting.
 - a. Air out building materials which "off-gas" chemical fumes, gases, or other contaminants in one of the following manners:
 - 1) Air out in a well-ventilated heated warehouse before they are brought to the project for installation.
 - 2) Air out installed products in accordance with the manufacturer's recommended "off-gassing" periods by allowing the period of time to elapse prior to Substantial Completion date.
 - b. If the work will generate toxic gases that cannot be contained in an isolated area, the work must be done when building is not occupied. The building must be properly ventilated and the material must be given proper time to cure or "off-gas" before occupancy.

2. Manufacturer's Material Safety Data Sheets (MSDS) shall be maintained at the site for all products used in the project. MSDS must be provided to Owner and anyone who requests them.

1.7 SPECIAL PROJECT CONDITIONS

- A. The project is in a watershed area and all run off shall be managed as per contract documents. DEC and DEP to be notified immediately of any spills of hazardous materials or chemicals must be contained and removed properly.

1.8 PAYROLLS AND PAYROLL RECORDS

- A. In accordance with Article 8, Section 220 of the New York State Labor Law, every contractor and subcontractor must keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. Payrolls must be maintained for at least three years from the project's date of completion. At a minimum, payrolls must show the following information for each person employed on a public work project.
 1. Name
 2. Classification(s) in which the worker was employed
 3. Hourly wage rate(s) paid
 4. Supplements paid or provided
 5. Daily and weekly number of hours worked in each classification
- B. Every contractor and subcontractor shall submit to Owner, within thirty (30) days after issuance of it's first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

1.9 CONTRACT AGREEMENT

- A. The following documents shall constitute the Contract Documents Agreement:
 1. AIA Document A101-2007 entitled as modified "Standard Form of Agreement Between Owner and Contractor," Certificate of Capital Improvement, Manufacturers' Warranties, Contractor's Warranty (set forth in Paragraph ___ of the Rider which shall survive the Agreement and completion of the Work), AIA documents G701, G703, G706, G706A and Waiver of Lien form.
 2. Specifications set forth as Division 02,03,04,05,06,07,08,09,010,011,013 including section 031,032 and 033 of the Project Manual, for New Kitchawan Fire and Rescue Station, prepared by Sullivan Architecture, P.C., dated 4/29/14 (the "Specifications").
 3. Drawings: Architectural & MEP – See Bid Statement and all latest revisions.
 4. 2007 Edition of AIA document A201 entitled "General Condition of Contract for Construction" (the "General Conditions").
 5. Project Manual Division 00 and Division 01.
 6. Bid Sheet of the successful Bidder and Bid Proposal.
 7. Scope of Work Summary Letter.

Bid - Scope of Work – Additional Summary

Bid shall be based upon all bid documents and specifications and all addendum including the scope listed below.

A. General**Architectural:**

1. To all bidders: The general contractor is the applicant for the project. The building permit will be in the applicant's name. The documents will be filed by the applicant and information required to be submitted will be provided by project architect, consultants and owner. All fees associated for building permits will be provided by owner if required. The town has agreed to waive all bonds and final fee amounts are to be determined.
2. To all bidders: The general contractor is responsible for all dumpsters required and removal of all selectively demolished or discarded materials from all trades. Dumpsters shall be located on site inside the area of disturbance. The contractor must make every effort to recycle all materials if possible.
3. To all bidders: The general contractor and subcontractors are responsible for his / her own construction trailer/s or other temp. storage shed/s as required based upon need. No construction trailer is required under this bid and each bidder shall determine his minimum needs to accomplish the work. Trailers shall be located on site if required and inside the area of disturbance.
4. To all bidders: New York State Wage Rate Schedules;
 - a. The minimum prevailing rate of wages, health and welfare and pension fund contributions are determined by the Industrial Commissioner of the State of New York in accordance with the provisions of section 220 of the labor law of New York State.
 - b. It shall be the sole responsibility of each contractor to pay wages at least equal to current and future wage rate schedules which are applicable to this project through the entire duration of the contract without claiming extra costs. General Contractor is responsible for keeping up to date will all supplements and postings issued by NYSDOL and is responsible for all subcontractors.
 - c. Wage Rate schedules are provided in the project Manual as a courtesy only. The Owner and Architect do not warrant the accuracy or pertinency of the wage rates stated.
 - d. General contractor is required to submit certified payrolls as per NYSDOL requirements and state law to the Owner Directly.
5. The General Contractor is responsible for all NYSDOT work signage as per HP-3.
6. The project is sales tax exempt.
7. To all Bidders – The bid for the project will require a bid and performance bond and a labor and material bond.

END OF SECTION 011000

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November 24, 2003

SECTION 012100 - ALLOWANCES**1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Cost per unit allowances, based on allowance noted in drawings. Contractor shall verify the quantity of material required.

1.2 SELECTION AND PURCHASE

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

1.3 SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

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

November 24, 2003

1.5 COST PER UNIT ALLOWANCES

1. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site. Installation cost is also included.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

END OF SECTION 012100

SECTION 012300 - ALTERNATES

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

Add Alternate #1 –

GC and Electrical Subcontractor to furnish and install New Gym Lighting in the same locations as existing. All labor, materials and man lifts to furnish and install new fixtures and mounting as indicated on Architectural and Electrical engineering documents shall be included in add alternate price and indicated on bid form accordingly.

Add Alternate #2 –

GC and Electrical / Plumbing Subcontractors to furnish and install alternate natural gas generator as shown on architectural and engineering documents. Base bid is a Diesel Generator with day tank and secondary tank. All labor, materials and excavation required to furnish and install the alternate new natural gas generator and new gas service including piping and excavation and engineered backfill as per ConEd requirements shall be included in add alternate price and indicated on bid form accordingly. New service shall connection to existing street mains and run to the new generator and connect back to the building and reconnect to existing/new piping as per engineering documents. New Utility meter shall be included. See engineering documents for full scope of work. Please note with this alternate a smaller concrete pad and enclosure fencing would be required and this should be factored into alternate pricing.

Add Alternate #3 –

GC and Electrical Subcontractors to furnish and install ADA automated main entrance and vestibule ada access hardware components to one side of the existing doors at the entrance and vestibule to provide enhanced ada in-line access. Doors shall not be interconnected to save energy. See architectural documents and door hardware set #6 for scope. All devices that require power shall be provided such by electrical contractor and all line and low voltage wiring and power supplies are to be furnished and installed.

Deduct Alternate #4 –

GC and subcontractors to provide a deduct price for the new library door/sidelight assembly including all labor and hardware tagged #103 on plans including all cutting and patching of walls and ceiling header at old door location. Existing Library doors would remain.

Add Alternate #5 –

In lieu of standalone thermostats for RTU-1, HV-1 and AC-1 provide internet-connected controls to allow ability to modify temperatures and schedules remotely. Internet-connected control system shall be similar to Honeywell WebStat consisting of T7350 communicating commercial

programmable thermostats and WebStat controller. Internet-connected controls shall allow configuring and monitoring of RTU-1, HV-1 and AC-1 through Web-based interface. Provide programming and training to building personnel.

Add Alternate #6 –

In lieu of standalone thermostats for RTU-1, HV-1 and AC-1 provide integration into existing Andover BMS. Provide all hardware and software upgrades to the BMS to fully integrate RTU-1, HV-1 and AC-1 as well as maintaining connectivity of the existing boiler system. Provide programming and training to building personnel.

END OF SECTION 012300

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by the General Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing General Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of General Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - 2. Submit the Schedule of Values to Architect and Owner's Representative at pre-construction conference.
- B. Format and Content: Use the items' breakdown on the Bid Sheet as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. General Contractor's name and address.
 - d. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of contractor or subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide several line items for principal subcontract amounts, where appropriate.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. 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 AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of General Contractor. Architect may return incomplete applications without action.
1. Entries shall match data on the Schedule of Values and General Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application 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, executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of contractors & subcontractors including phone numbers, fax numbers, business addresses and contact person.
 2. Schedule of Values.
 3. General Contractor's Construction Schedule.
 4. Submittals Schedule.
 5. Copies of building permits.
 6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 7. Certificates of insurance and insurance policies.
 8. Performance and payment bonds.
 9. Data needed to acquire Owner's insurance.
 10. Photographs of any pre-existing field conditions that may be construed as caused by construction activities.

- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum. Submit the following prior to Application for Payment:
 - a. All Project Record Documents (record drawings, etc.) as indicated in Division 1 Section "Closeout Procedures."
 - b. Balance reports of mechanical and electrical systems.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination Drawings.
 - 4. Administrative and supervisory personnel.
 - 5. Project meetings.
 - 6. RFI's
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid

conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.

1.4 SUBMITTALS

- A. Staff Names: Within 7 days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.5 REQUESTS FOR INFORMATION (RFI's)

- A. All requests for information or clarification shall be forwarded to the General Contractor. Requests for information which cannot be answered by the General Contractor shall be forwarded to the Architect. General contractor shall maintain a log of the status of each request, which shall be prepared to discuss outstanding items at each progress meeting

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.7 PROJECT MEETINGS

- A. General: General Contractor will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: General Contractor will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.

- General Contractor will notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: General Contractor will prepare the meeting agenda. General Contractor will distribute the agenda to all invited attendees.
 3. Minutes: General Contractor will record significant discussions and agreements achieved. General Contractor will distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.
- B. Preconstruction Conference: General Contractor will schedule a preconstruction conference before starting construction, at a time convenient to Owner, General Contractor and Architect, but no later than 15 days after execution of the Agreement. General Contractor will hold the conference at Project site. General Contractor will conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, General Contractor, Architect, and their consultants; 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 Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and storage areas.
 - n. Equipment deliveries and priorities.
 - o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Working hours.
- C. Preinstallation Conferences: General Contractor shall conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with

- other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Required performance results.
 - u. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements.
 4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: General Contractor will conduct progress meetings at bi-weekly intervals in the temporary office at the project site. General Contractor will preside over these meetings.
1. Attendees: In addition to representatives of Owner, General Contractor, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- a. General Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
 - 14) Documentation of information for payment requests.
3. Reporting: General Contractor will distribute minutes of the meeting to each party present and to parties who should have been present. General Contractor will include a brief summary, in narrative form, of progress since the previous meeting and report.
- a. Schedule Updating: Revise General Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule to General Contractor promptly to allow for coordination of schedules and revision to Project Construction Schedule.
- E. Coordination Meetings: General Contractor will conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, General Contractor, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Project Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Project Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: General Contractor will revise Project Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. General Contractor will issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
3. Reporting: General Contractor will record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting Applications for Payment.
 - 2. Division 1 Section "Project Management and Coordination" for submitting Coordination Drawings.
 - 3. Division 1 Section "Quality Requirements" for submitting test and inspection reports and Delegated-Design Submittals and for erecting mockups.
 - 4. Division 1 Section "Closeout Procedures" for submitting warranties Project Record Documents and operation and maintenance manuals.
 - 5. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's and Construction Manager's responsive action.
- B. Informational Submittals: Written information that does not require Architect's and Construction Manager's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings may be requested from the Architect for Contractor's use in preparing submittals. Four (4) total copies of each submittal will be required.

- B. All submittal shall be forwarded to and/or through the General Contractor.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Architect's receipt of submittal. General Contractor shall review all submittals prior to Architect / Consultant review.
1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow 15 days for initial review of each submittal.
 3. If intermediate submittal is necessary, process it in same manner as initial submittal.
 4. Allow 8 days for processing each re-submittal.
 5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of General Contractor.
 - d. Name and address of subcontractor.
 - e. Name and address of supplier.
 - f. Name of manufacturer.
 - g. Unique identifier, related to Specifications Section, including revision number.
 - h. Drawing number and detail references, as appropriate.

- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- G. Transmittal: Transmit all submittals specified in this section to General Contractor who will review and will distribute to Architect for their review. Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than General Contractor.
 - 1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Use only final submittals with mark indicating action taken by Architect and Construction Manager in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- 1. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.

- j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 4. Submit Product Data before or concurrent with Samples.
 5. Number of Copies: Submit three (4) copies of Product Data, unless otherwise indicated. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
 3. Number of Copies: Submit four opaque copies of each submittal. Architect may retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Document.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit four sets of Samples. Architect may retain two Sample sets; remainder will be returned. Mark up and retain one returned copy as a Project Record Document.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
 - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."
- B. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- K. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
1. Name of evaluation organization.
 2. Date of evaluation.
 3. Time period when report is in effect.
 4. Product and manufacturers' names.
 5. Description of product.
 6. Test procedures and results.
 7. Limitations of use.
- L. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."
- M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."
- Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.

5. Required adjustments.
 6. Recommendations for cleaning and protection.
- S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- U. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect, except as required in "Action Submittals" Article.
1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear General Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
- C. Submittals not required by the Contract Documents will not be reviewed.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve General Contractor of responsibility for compliance with the Contract Document requirements.
 - 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 tests, inspections, and related actions do not limit General Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for General Contractor to provide quality-control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 1 Section "Cutting and Patching" for new work.
 - 2. Divisions 2 through 32 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect or.

- C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 SUBMITTALS

- A. Qualification Data: Provide data for testing agencies to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
 2. Description of test and inspection.
 3. Identification of applicable standards.
 4. Identification of test and inspection methods.
 5. Number of tests and inspections required.
 6. Time schedule or time span for tests and inspections.
 7. Entity responsible for performing tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Ambient conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

1.6 QUALITY CONTROL

- A. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
- B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were General Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect and General Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and General Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 5. Do not perform any duties of General Contractor.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field-curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are General Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015240 – CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Salvaging non-hazardous demolition and construction waste.
 - 2. Recycling non-hazardous demolition and construction waste.
 - 3. Disposing of non-hazardous demolition and construction waste.

1.2 RELATED DOCUMENTS

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

1.3 RELATED SECTIONS

- A. Section 018113 - "Sustainable Design Requirements".

1.4 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Develop a waste management plan that results in End-of-Project rates for salvage/recycling of 95 percent by weight of total waste generated by the Work. Excavation materials (soils, rock), land clearing debris (trees, shrubs, other plant materials), and hazardous wastes are excluded from the calculation.

1.6 SUBMITTALS

- A. Waste Management Plan: Contractor to submit the waste management plan to the Owner for review at least 30 days prior to the date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste. Include the following information:
1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste in **tons**.
 4. Quantity of waste salvaged, in **tons**.
 5. Quantity of waste recycled, in **tons**.
 6. Total quantity of waste recovered (salvaged plus recycled) in **tons**.
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated End-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

- B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 5. Targeted Material Types: Materials for potential salvaging or recycling shall include, but not be limited to, the following:
 - a. Concrete
 - b. Brick
 - c. Stone
 - d. Concrete masonry units (CMU)
 - e. Asphalt
 - f. Metals (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, brass, bronze)
 - g. Cardboard, paper, packaging
 - h. Beverage containers
 - i. Reuse items indicated on the Drawings and/or elsewhere in the Specification
 - j. Clean dimensional wood
 - k. Asphalt shingles or roofing
 - l. Drywall
 - m. Carpet and pad
 - n. Ceiling tiles
 - o. Glass
 - p. Plastics
 - q. Paint
 - r. Fluorescent lamps
 6. Sorting and Handling Procedures: Identify method that will be used for separating and handling recyclable waste.

- a. If waste sorting and recycling is to be performed on-site, describe staging area(s), quantity and type of containers, frequency of pick-up, signage, etc.
- b. If waste sorting and recycling is to be performed off-site, describe the process by which mixed C&D waste will be delivered off-site, as well as the off-site process for sorting material, quantifying, and documenting the waste to be recycled.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 1. Distribute waste management plan to everyone concerned within thirty (30) days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site.

Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Sale and Donation: Not permitted on Project site.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. Procedures: Implement approved Waste Management Plan through on-site or off-site separation and reclamation of recyclable materials.
- B. Where feasible, return reusable packaging (pallets, etc.) to the applicable product manufacturers.
- C. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

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SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 1 Section "Allowances" for products selected under an allowance.
 - 2. Division 1 Section "Alternates" for products selected under an alternate.
 - 3. Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.
 - 4. Divisions 2 through 32 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.
- D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 - 1. Coordinate product list with General Contractor's Construction Schedule and the Submittals Schedule.
 - 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 - 3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - a. At General Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.

4. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect will notify General Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

- a. Form of Acceptance: Change Order. Use AIA Document G701.
- b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

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

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 9. Protect stored products from damage.
- B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 2 through 32 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

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

5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures: Procedures for product selection include the following:
1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
 - a. Substitutions may be considered, unless otherwise indicated.
 2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated.
 3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated.
 4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated.
 5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
 6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
 7. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.

8. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product[s]" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Substitutions may be considered, unless otherwise indicated.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.
 - a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 45 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider General Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may

- include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect General Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 7. Requested substitution is compatible with other portions of the Work.
 8. Requested substitution has been coordinated with other portions of the Work.
 9. Requested substitution provides specified warranty.
 10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

- A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Coordination of Owner-installed products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical, plumbing and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.

- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical, plumbing and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Owner not less than two days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Owner's written permission.
- C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain maximum headroom clearance in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

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

3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

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

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Divisions 2 through 32 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section also apply to mechanical, plumbing and electrical installations.
- C. Coordinate cutting and patching requirements with new work. Selective demolition of 'new work' is not allowed.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a brief outline describing procedures prior to the time cutting and patching will be performed. Request approval to proceed from General Contractor. Include the following information:
 - 1. Extent: Describe cutting and patching, scope, means and methods.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.

3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Minimize cutting and patching of work by properly coordinating construction sequences.
- B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 1. Obtain Architect's approval before cutting and patching any structural work that is not indicated on drawings.
- C. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire-protection systems.
 4. Control systems.
 5. Communication systems.
 6. Electrical wiring systems.
- D. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Equipment supports.
 4. Piping, ductwork, vessels, and equipment.
 5. Noise- and vibration-control elements and systems.
- E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed

on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Mechanical, Plumbing and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, 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 painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Replace, patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

END OF SECTION 017329

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Project Record Documents.
 - 2. Operation and maintenance manuals.
 - 3. Instruction of Owner's personnel.
 - 4. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 2. Divisions 2 through 32 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.

7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
12. Complete final cleaning requirements, including touchup painting.
13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify General Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify General Contractor of items, either on General Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

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

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify General Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 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 General 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 General Contractor.
 - e. Page number.

1.6 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.
1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.

5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
 6. Signature of respective Contractor.
- C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Note related Change Orders, Record Drawings, and Product Data, where applicable.
- D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.
- E. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- 1.7 OPERATION AND MAINTENANCE MANUALS
- A. Assemble 3 complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:
1. Operation Data:
 - a. Emergency instructions and procedures.
 - b. System, subsystem, and equipment descriptions, including operating standards.
 - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
 - d. Description of controls and sequence of operations.
 - e. Piping diagrams.

2. Maintenance Data:

- a. Manufacturer's information, including list of spare parts.
 - b. Name, address, and telephone number of Installer or supplier.
 - c. Maintenance procedures.
 - d. Maintenance and service schedules for preventive and routine maintenance.
 - e. Maintenance record forms.
 - f. Sources of spare parts and maintenance materials.
 - g. Copies of maintenance service agreements.
 - h. Copies of warranties and bonds.
- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.8 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. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of 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 8-1/2-by-11-inch (115-by-280-mm) 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.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Provide instructors experienced in operation and maintenance procedures.
 - 2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
 - 3. Schedule training with Owner, with at least seven days' advance notice.
 - 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.

3.2 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

- e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - f. Sweep concrete floors broom clean in unoccupied spaces.
 - g. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - i. Remove labels that are not permanent.
 - j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - l. Replace parts subject to unusual operating conditions.
 - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - p. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

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SECTION 033000 Cast in Place Concrete

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of concrete work is shown on drawings.

B. Concrete work consists of mixing, finishing, and curing of all concrete; furnishing and erecting all reinforcing steel; and furnishing, erecting and removal of concrete form work.

C. Concrete work shall also include but is not necessarily limited to the following:

1. Setting all inserts, and other embedded items indicated on the drawings and/or required for the work and furnished under other specification sections including grouting base plates.
2. Pumping and other methods of installing concrete at no additional expense to the Owner.
3. Unit prices for concrete work.
4. Supply and install required sleeves for utility services. Exact location and sizes to be provided later.
5. Application of sealer to exterior concrete surfaces.

D. Work Not Included:

1. Plant and field inspection and testing for concrete.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Furnishing anchor bolts and structural bars and mesh shall be by GC for addition as shown on documents.

1.04 QUALITY ASSURANCE

A. Except as modified by governing codes and by this Specification, comply with the applicable provisions and recommendations of latest editions of the following:

1. American Concrete Institute Publications:
 - a. ACI-301 "Standard Specifications for Structural Concrete."
 - b. ACI-214 "Recommended Practice for Evaluation of Strength Test Results of Concrete."
- c. ACI-302.1R "Guide for Concrete Floor and Slab Construction."
- d. ACI-311.4R "Guide for Concrete Inspection."

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- e. ACI-315 "Details and Detailing of Concrete Reinforcement."
 - f. ACI-318-02 "Building Code Requirements for Structural Concrete."
 - g. ACI-347R "Guide to Formwork for Concrete."
 - h. ACI-306R "Cold Weather Concreting."
 - i. ACI-305R "Hot Weather Concreting."
 - j. ACI-211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, Mass Concrete."
 - k. ACI-211.2 "Standard Practice for Selecting Proportions for Structural Lightweight Concrete."
 - l. ACI-304R "Guide for Measuring, Mixing, Transporting and Placing Concrete."
 - m. ACI-309R "Guide for Consolidation of Concrete."
 - n. ACI-212.3R "Chemical Admixtures for Concrete."
 - o. ACI-212.4R "Guide for the Use of High-Range Water-Reducing Admixtures in Concrete."
- 2. Concrete Reinforcing Steel Institute
 - a. CRSI-63 "Recommended Practice for Placing Reinforcing Bars."
 - b. CRSI-65 "Recommended Practice for Placing Bar Supports, Specifications, and Nomenclature."
 - 3. American Welding Society
 - a. AWS D12.1 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction."
 - 4. American Society for Testing Materials (ASTM)
 - a. A-615 "Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement or A-706 Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement."
 - b. A-185 "Specification for Welded Wire Fabric, Plain, for Concrete Reinforcement."
 - c. C-31 "Standard Practice for Making and Curing Concrete Test Specimens in the Field."
 - d. C-33 "Specification for Concrete Aggregates."
 - e. C-39 "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."
 - f. C-42 "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."
 - g. C-94 "Standard Specifications for Ready-Mixed Concrete."
 - h. C-150 "Standard Specification for Portland Cement."
 - i. C-494 "Standard Specification for Chemical Admixtures for Concrete."

B. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

C. Conflicts: Conform to requirements of above standard unless specified otherwise herein below. In case of apparent conflict between standards, or between standards and the specifications herein below, refer the matter to the Architect,

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whose decision shall be final.

D. Owner's acceptance: Owner reserves the right to reject or accept supplier of concrete materials.

E. Workmanship: The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength tolerances, and finishes. Correct deficient concrete as directed by the Engineer and coordinated with the Architect.

F. Test for Concrete Materials:

1. Test Aggregates by method of sampling and testing of ASTM C-33.
2. For Portland Cement, sample the cement and determine the properties by the methods of test of ASTM C-150.
3. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Architect.
4. Concrete Testing Service: Employ at Owner's expense a New York City Department of Buildings Certified Testing Agency as directed by the Architect to perform material evaluation tests and to design concrete mixes.
5. Materials and installed work may require testing and retesting, as directed by the Architect, at anytime during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, polymer patching compounds, water-stops, joint systems, curing compounds, dry-shake finish materials, and other as requested by Architect.

B. Shop Drawings:

1. Reinforcement: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 "Details and Detailing of Concrete Reinforcement" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required and openings through concrete structures. Wall elevations shall be detailed at scale of 1/4 inch equal one foot. Submit 4 prints to the Architect for review and approval
2. General Contractor shall coordinate and locate all openings to be formed for all trades, and locate same on reinforcing shop drawings.
3. Shoring and reshoring framing details, phasing, and materials shall be submitted for approval.
4. Architect's review is for general architectural applications and features

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only. Design of formwork for structural stability and efficiency is Contractor's responsibility.

5. Contractor's Responsibility: The Architect's acceptance shall not relieve the Contractor of responsibility for any error or for furnishing material of the proper size, quantity or quality.

6. Drawings at Job Site: The Contractor shall keep a set of shop drawings with the Architect's acceptance stamp on the job site at all times.

A. Note: Concrete installer shall maintain a copy of anchor bolt layout shop drawings at all times.

C. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.

D. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design as specified.

1. Preliminary Design Mix Test Reports (ACI-301) or verification of mix designs based on standard deviation analysis. The mix design submittal must be signed and sealed by an engineer registered in the state of the Project.

2. Air Entrainment Testing (ASTM C173) for normal and lightweight concrete and ASTM C231 for normal weight concrete.

E. Calculations: Furnish calculations for shoring and reshoring, signed and sealed by a Professional Engineer registered in the state of this project.

F. Material Certificates: Provide material certificates in lieu of materials laboratory test reports when permitted by the Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. This does not preclude the requirement that the design mix test must be performed and results submitted to the Architect showing water-cement ratio curves.

1.06 PRODUCT HANDLING

A. Comply with ACI-301, Chapter 5.

1.07 ENVIRONMENTAL CONDITIONS

A. Cold Weather Concreting: Refer to Part 1, paragraph "Standards."

B. Hot Weather Concreting: Refer to Part 1, paragraph "Standards."

PART 2 – PRODUCTS

2.01 MATERIALS

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

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- a. Portland Cement: ASTM C 150, Type I, II or I/II (50% min and 100% max. by weight) Supplemented with the following:
- b. Fly Ash: ASTM C 618, Class C. (25% max by weight)
- c. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120. (25% max by weight, Slag + Silica Fume to be 25% max. by weight)
- d. Silica Fume: ASTM C 1240, amorphous silica. (10% max. by weight, Slag + Silica Fume to be 25% max. by weight)

B. Admixtures

1. Water Reducing Admixture: The admixture shall conform to ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water. Provide one of the following:
 - a. "Eucon WR-75 or WR-89" (The Euclid Chemical Co.)
 - b. "Pozzolith 200N" (Master Builders)
 - c. "Plastocrete 160" (Sika Chemical Corp.)
 - d. "WRDA with Hycol" by (W.R. Grace & Co.)
2. Water Reducing Retarding Admixture: The admixture shall conform to ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water. Provide one of the following:
 - a. "Eucon Retarder-75" (The Euclid Chemical Co.)
 - b. "Pozzolith 100XR" (Master Builders)
 - c. "Plastiment" (Sika Chemical Corp.)
 - d. "Daratard 17" (W.R. Grace & Co.)
3. High Range Water-Reducing Admixture (Superplasticizer): The admixture shall conform to ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water. Provide one of the following:
 - a. "Eucon 37" (The Euclid Chemical Co.)
 - b. "Rheobuild 1000" (Master Builders)
 - c. "Sikament" (Sika Chemical Corp.)
 - d. "Daracem 19 or Daracem 100" (W.R. Grace & Co.)
4. Non-Corrosive, Non Chloride Accelerator: The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Provide one of the following:
 - a. "Accelguard 80" (The Euclid Chemical Co.)
 - b. "Polarset" (W.R. Grace & Co.)
5. Air Entraining Admixtures: Conform to ASTM C-260. Provide one of the following:
 - a. "Air-Mix" (The Euclid Chemical Co.)
 - b. "Daravair" (W.R. Grace Co.)
 - c. "MB-VR or Micro-Air" (Master Builders Co.)
 - d. "Sika-AER" (Sika Chemical Corp.)
6. Silica Fume Admixtures:
 - a. "Force 10,000" (W.R. Grace Co.)

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b. "Eucon MSA" (The Euclid Chemical Co.)

c. "Sikacrete 950" (Sika Chemical Co.)

7. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted. No admixture shall cause an increase in shrinkage when tested in accordance with ASTM C494 and ASTM C157.

8. Certification: Written conformance to the abovementioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to mix design review by the Engineer.

C. Water: Conform to ACI-301, Chapter 4, paragraph 4.2.1.3.

D. Fine Aggregate: Conform to requirements of ASTM C-33.

1. It shall not contain more than 3% clay.

2. It shall not show darker than light amber when tested by the calorimetric method.

3. The gradation of the sand shall be constant and the Fineness Modulus shall not vary more than 0.2.

4. It shall conform to the following gradation requirements:

SIEVE 3/8" No. 4 No. 16 No. 50 No. 100

% Passing 100 95-100 50-85 10-30 2-10

E. Coarse Aggregate: Shall conform to the requirements of ASTM Designation C-33 Size Number 67 and shall consist of hard crystalline stone or gravel, free from shale or decomposed or thin, laminated pieces. It shall be uncoated and clean. It shall conform to the following gradation requirements.

SIEVE 1" 3/4" 3/8" No. 4 No. 8

% Passing 100 90-100 20-55 0-10 0-5

F. Water: Potable, clean, fresh.

G. Metal Reinforcement: ASTM A-615, Grade 60, new deformed billet stock, or ASTM A-706, Minimum Yield Stress 60,000 psi:

1. For fabrication tolerances conform to ACI-301, Chapter 5, paragraph 5.4

2. All reinforcing bars having assigned positions shall have distinguishing marks plainly indicated thereon, which marks shall agree with those given on the shop drawings related to or calling bars.

3. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so post consumer recycled content plus one-half of pre consumer recycled content are not less than 80 percent.

H. Welded Wire Fabric: ASTM A-185; size shown on Drawings.

I. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

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1. For slab on grade and footings use supports with sand plates or horizontal runners where base material will not support chair legs.
2. For exposed to view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1), stainless steel protected (CRSI, Class 2), or hot dipped galvanized.

J. Non-Shrink, Non-Metallic Grout

1. The non-shrink grout shall be the specified factory pre-mixed grout and shall conform to ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)". In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 4' x 4' base plate. Provide one of the following:
 - a. "Euco NS" (The Euclid Chemical Co.)
 - b. "Masterflow 713" (Master Builders)
2. When high fluidity and/or increased placing time is required use high flow grout. In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 18" x 36" base plate. Provide one of the following:
 - a. "Euco Hi-Flow Grout" (The Euclid Chemical Co.)
 - b. "Masterflow 928" (Master Builders)

K. Clear Curing and Sealing Compound (VOC compliant): The compound shall have 30% solids content minimum, and will not yellow under ultra violet light after 500 hours of test in accordance with ASTM D4887 and will have test data from an independent testing laboratory indicating a maximum moisture loss of 0.39 grams per sq. cm. when applied at a coverage rate of 300 sq. ft. per gallon. Provide the following:

1. "Super Diamond Clear VOX" (The Euclid Chemical Co.)

L. Formwork:

1. For unexposed surfaces and rough work, use Exterior Type Douglas Fir, Grade B-B (Concrete Form) Plywood conforming to NBS PS-1, minimum 3/4 inch thick, or undressed lumber, No. 2 common or better. Before reusing forms, withdraw nails and thoroughly clean surfaces to be in contact with concrete. Use "kifs" to provide proper bond where surfaces are scheduled to be plastered.
2. For exposed surfaces not otherwise specified use Special Type Douglas Fir, Grade A-B plywood, conforming to NBS PS-1, minimum 3/4 inch thick and constructed so that finished concrete will be straight, smooth, dense, free from honeycombs, bulges or depressions. Keep joints between sections to a minimum and make tight and strongly backed so that adjoining edges remain flush and true. Unsightly joint marks will not be permitted. Cover joints on exposed surfaces with smooth-faced vinyl tape where indicated on drawings. See Article 3.9 for special finishes where indicated on drawings.

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U. Repair Topping: Self-leveling, polymer modified high strength topping: Product shall be "Thin Top SL" by The Euclid Chemical Co. The topping shall exhibit the following properties:

1. Chaplin Abrasion Test - 020 mm (0.0079") maximum @ 28 days (British Standard 8204)
2. Tensile Bond Strength Reichold Method - 1400 psi @ 14 days.

V. Synthetic Fibers: Monofilament or fibrillated polypropylene fibers for secondary reinforcing of concrete members. Product shall have a UL rating. Provide one of the following:

1. "Fiberstrand" (The Euclid Chemical Co.)
2. "Fibermesh" (Fibermesh, Inc.)

2.02 MIXES

A. Proportioning of Concrete:

1. Assume full responsibility for the strength consistency, water-cement ratio, and handling of concrete. Design mixes in accordance with ACI-211.1/211.2 and ASTM C-94
2. Use the minimum amount of water necessary to produce a mix that can be worked readily into corners of forms and around reinforcement without permitting segregation of materials or free water to collect on surfaces.
3. Adjust the consistency of any mix to allow for specific placing conditions. The slump of concrete filling small, thin, complicated forms shall be greater than for large masses; the degree of slump being governed by the least dimensions of the forms. Maximum slump for concrete shall be tested in accordance with ASTM C-143, and as shown on the drawings. See paragraph 2.02 F for specified maximum slump.
4. Measure materials for concrete by weighing. Separately weigh each size of aggregate and the cementitious materials; each accurate within "1%. Cement in sacks of ninety-four (94) pounds need not be weighted, but weigh bulk cement and fractional package. Measure mixing water by weight or volume to a tolerance of "2%. Admixtures shall be measured by volume to a tolerance of "3%.
5. Prepare design mixes, prior to the beginning of the work, in accordance with ACI-301, Section 4.2.3, "Proportioning" on the basis of field data or trial mixtures. Refer to Section I, paragraph 1.6 "Quality Assurance" for requirements for preliminary test as required.
6. Air entrain all concrete exposed to freezing and thawing or deicer chemicals in accordance with ACI-318, Chapter 4, paragraph 4.2, determined by volume, as per ASTM C-173 or ASTM C-231.
7. Rejected Concrete: Concrete in ready-mix trucks rejected for excess water shall be removed from the site. No materials shall be added for correction.

B. Classes of Concrete:

1. The strength of the concrete for each portion of the structure shall be in accordance with the requirements indicated on the structural drawings.
2. For maximum size of coarse aggregate, comply with ACI-301, Chapter 4,

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paragraph 4.2.2.3.

C. Cement Fill: Make cement filled steel pan-type stairs, platforms and floor landings "non-slip" by using 1/4 pound of fine abrasive "Alundum" aggregate for each square foot of area. Abrasive aggregate shall be composed from 60% to 70% of aluminum oxide abrasive bonded by a vitreous ceramic material. Use hard, homogeneous, non-glazing, rust-proof aggregate which is unaffected by moisture or cleaning compounds.

D. All concrete must contain the specified water-reducing admixture or the specified high-range water-reducing admixture (superplasticizer). All concrete slabs placed at air temperatures below 50 degrees F shall contain the specified noncorrosive, non-chloride accelerator. All concrete required to be air entrained shall contain an approved air entraining admixture. All pumped concrete, concrete for industrial slabs, synthetic fiber concrete, architectural concrete, concrete required to be water tight or concrete with a water/cement ratio below 0.50 shall contain the specified high-range water-reducing admixture (superplasticizer).

E. Water/Cement Ratio: All concrete intended to have low permeability when exposed to water shall have a maximum water/cement ratio of 0.50 (4000 psi at 28 days or more). All concrete exposed to freezing and thawing in a moist condition shall have a maximum water/cement ratio of 0.45 (4500 psi at 28 days or more). All reinforced concrete exposed to brackish water, deicing salt, seawater or spray from these sources and all parking slabs shall have a maximum water/cement ratio of 0.40 (5000 psi at 28 days or more). Use highrange water-reducing admixture in pumped concrete, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.

F. All concrete containing the high-range water-reducing admixture (superplasticizer) shall have a maximum slump of 9" unless otherwise approved by the Architect. The concrete shall arrive at the job site at a slump of 2" to 3", (3" to 4" for concrete receiving a "shake-on" hardener or lightweight concrete), be verified, then the high-range water-reducing admixture added to increase the slump to the approved level. All other concrete shall have a maximum of 4".

2.03 PRE-CONCRETE CONFERENCE

A. At least 35 days prior to start of the concrete construction schedule, the Contractor shall conduct a meeting to review the proposed mix designs and to discuss the required methods and procedures to achieve the required concrete construction.

B. The Contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:

1. Contractor's superintendent
2. Laboratory responsible for the concrete design mix

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3. Laboratory responsible for field quality control –
4. Concrete subcontractor –
5. Ready - mix concrete producer –
6. Admixture manufacturer (s) –
7. Concrete pumping contractor

C. Minutes of the meeting shall be recorded, typed and printed by the Contractor and distributed by him to all parties concerned within 5 days of the meeting. One copy of the minutes shall also be transmitted to the following for information purposes: Owner's representative - Resident Engineer - Consultant Engineer.

D. The minutes shall include a statement by the admixture manufacturer(s) indicating that the proposed mix design and placing techniques can produce the concrete quality required by these specifications.

PART 3 – EXECUTION

3.01 LAYOUT:

- A. The building envelope shall be site located by a licensed land surveyor. Surveyor shall provide working points to allow field location of building corners and column lines.
- B. Anchor bolt layout shall be by licensed land surveyor in conjunction with a representative of the steel frame manufacturer.
- C. A copy of foundation as built conditions in relation to site boundaries shall be provided to the Owner and building department. The 'as built' survey shall be provided by the same licensed land surveyor utilized in items 'A' and 'B' above.

3.02 FORMWORK:

A. General

1. Forms shall conform to the lines, dimensions and shapes of concrete shown providing for openings, recesses, keys, slots, beam pockets and projections as required.
2. Make forms clean and free of foreign material before placing concrete.
3. Do not use earth cuts as forms for vertical surfaces, unless approved by the Architect.

B. Design of Formwork

1. Comply with ACI-301 Chapter 2, paragraph 2.2.2. Design of formwork shall be by a licensed professional engineer employed by the Contractor; with formwork drawings bearing the seal of the licensed engineer.
2. Form rods and tie wires of exterior surfaces shall slope down from the inside to outside of forms.
3. Provide forms so that no discernible imperfection is in evidence in finished concrete surfaces due to deformation bulging, jointing, or leakage of forms.

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C. Tolerances

1. Comply with ACI-301, Chapter 2, paragraph 2.3.1.2, except as otherwise noted.

D. Preparation of Form Surfaces

1. Comply with ACI-301, Chapter 2, paragraphs 2.3.1.12 and 2.3.1.13.
2. Use non-staining mineral oil or form lacquer.

3.03 REINFORCEMENT

A. General: Comply with ACI-301, Chapter 3, paragraph 3.1

B. Placing Tolerances: Comply with ACI-301, Chapter 3, paragraph 3.3.2.1.

C. Placing

1. Comply with ACI-301, Chapter 3, paragraph 3.3. When splices not shown on Drawings are approved by the Architect, such splicing shall conform to ACI-318.
2. Place reinforcing bars having assigned positions so that distinguishing marks agree with those given on the shop drawings relating to or calling for the bars.
3. Secure all reinforcing bars in place with high-density plastic or galvanized metal chairs with plastic tipped legs, supporting and spacing devices and metal tying devices. Reinforcing in concrete members that have one or more surfaces exposed whether painted or unpainted finish, shall be tied with 14 gage soft annealed galvanized wire. Uncoated tie wire in exposed members will not be accepted.

D. Minimum Reinforcement: Where no other reinforcement is shown for concrete fill or toppings, provide 6 x 6 - W2.9 x W2.9 welded wire fabric.

E. Synthetic Fibers: All non-reinforced slabs and toppings shall contain the specified fibers. They shall be 3/4" in length and used at the dosage rate of 5.0 million fibers per cu. yd.

3.04 MIXING CONCRETE

A. Ready Mixed Concrete

1. Comply with ASTM C-94.
2. Add mixing water only at the site.
3. Discharge the concrete completely at the site within one and one-half hours after the introduction of the cement to the aggregates. In hot weather reduce this time limit so that no stiffening of the concrete shall occur until after it has been placed.
4. Begin the mixing operation within thirty minutes after the cement has been introduced to the aggregates.

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B. Batch Mixing at Site

1. Comply with ACI-301, Chapter 4, paragraph 4.3.
2. Excessive mixing requiring the addition of water to preserve the required consistency will not be permitted. Mix concrete to a consistency which can be readily placed without segregation.
3. Where admixtures are specified, equip mixers with a device for measuring and dispensing the admixture.

C. Hand-Mixed Concrete: When hand-mixed concrete is allowed and approved for certain parts of the work, mix on water-tight platforms. Proportion cement, sand and aggregate loose by volume, carefully measured. Thoroughly mix sand and cement together dry until the mixture is of uniform color. Add the aggregate and turn the mass over until the mixture is uniform and homogeneous. Add water by sprinkling and turn the mass over until it is uniformly mixed and of the required consistency.

D. Retempering shall not be permitted.

E. Redosage: Redosage with the specified high-range water-reducing admixture (superplasticizer) may be done with the prior approval of the structural engineer regarding dosage and time periods.

3.05 JOINTS AND EMBEDDED ITEMS

A. Construction Joints

1. Comply with ACI-301, Chapter 5, paragraphs 5.3.2.6 and 5.3.5. Control joints keyhold by Burke Concrete Accessories.
2. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
3. When construction joints are required or permitted, obtain bond by roughening the surface of the concrete in a manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface. Dampen the cleaned surface with water and apply the specified bonding compound. Place new concrete while the bonding compound is still tacky. Clean horizontal construction joints and place concrete containing the specified HRWR admixture for the first lift of approximately 12" deep. Remaining concrete may be conventional or superplasticized. In walls, do not space construction joints more than 40 ft. apart, unless otherwise shown.
4. Control joints on column center lines or as shown on plans. Maximum joint spacing shall be 36 times the slab thickness unless otherwise noted on drawings. Reinforcement shall not extend across construction joints and the joint detail shall be as noted on the drawings.
 - a. Limit placement to six bays. Omit control joints in floors receiving finish surface such as VAT, carpet, Q.T., etc.

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b. Contraction (Control Joints) in Slab-on-Grade: The Soff-Cut saw shall be used immediately after final finishing and to a depth of 1 1/4". A conventional saw shall be used as soon as possible without dislodging aggregate and to a depth of 1/4 slab thickness.

B. Expansion Joints

1. Comply with ACI-301, Chapter 2, paragraph 2.2.1.4 for expansion joint filler.
2. Install joint filler to allow the required dimension for sealant, as indicated. Dimensions shown on Drawings are based on an assumed design temperature of 70 deg. F. Concreting procedures shall take into account the ambient temperature range at the time of the respective operations.

C. Embedded Items

1. Comply with ACI-301, Chapter 2, paragraph 2.2.1.5.
2. Accurately set anchorage devices by line and transit, and coordinate the locating of all anchorage devices to be set for the accommodation of the work of other trades.
3. Locate anchor bolts as shown on the Drawings and on shop drawings. Obtain necessary templates from the mechanical trades as required for the proper setting of anchor bolts and other items for mechanical equipment, as required.
4. Assist other trades in the installation of piping, pipe sleeves, conduit and similar items where such items are to be installed in concrete. Provide frames to securely hold anchor bolts and anchorage devices in place during construction, and take care that no displacement occurs during the pouring of concrete. Under this Section furnish and set items not furnished by other trades using approved standard type items suitable for their intended purpose.

3.06 PLACING CONCRETE

A. Preparation Before Placing: Conform to ACI-301, Chapter 8, paragraph 8.1.

B. Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

C. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

D. General: Comply with ACI 304, and as herein specified. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable

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to its final location to avoid segregation.

E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints. Dropping of concrete over ten feet will not be permitted. Angle and length of chutes shall be limited to avoid segregation. Forms must be free from all dirt and foreign matter before placing of concrete begins.

F. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI-309, "Recommended Practices for Consolidation of Concrete."

G. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically and uniformly space locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layers and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

H. Placing Concrete Slabs: Deposit and consolidate concrete so it is thoroughly worked around reinforcement and other embedded items and into corners.

I. Bring slab surfaces to correct level with straightedging or striking off the surface of the concrete to a pre-determined grade (screeding). This must be done immediately after placement and completed before any excess moisture or bleeding water is present on the surface. Set edge forms and intermediate screed strips accurately and sufficiently rigid to support screeds and so that proper surface elevations and concrete thickness are achieved allowing for dead load deflection and camber of formwork.

J. Highway straightedge, bull floating or darbying should immediately follow screeding to eliminate the ridges and fill in the voids left by screeding and must be completed before any excess moisture or bleeding water is present on the surface.

1. This prepares the surface for subsequent edging, jointing, floating, and troweling.

K. Maintain reinforcing in proper position during concrete placement operations.

L. Surface Tolerance: Comply with following requirements based on ASTM E1155 Standard Test Method for Determining Floor Flatness and Levelness Using the "F-Number" System (inch-pound units).

1. Flatness F-Number: $F \leq 35$; differences in elevation between successive 12" measurements shall not exceed 0.13".

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2. Levelness F-Number: $F_i=30$; differences in elevation between two points shall not exceed $0.417"/10'-0"$.

3.07 CURING

A. Comply with ACI-301, Chapter 5, paragraph 5.3.6.

B. All exposed interior slabs and troweled slabs receiving mastic applied adhesive or "shake-on" hardeners shall be cured with the specified curing and sealing compounds. Exterior slabs, sidewalks, curbs, and architectural concrete, not receiving a penetrating sealer, shall be cured with the specified clear, nonyellowing curing and sealing compound.

3.08 FORM REMOVAL

A. Do not remove forms until the concrete has thoroughly hardened and has attained sufficient strength to support its own weight and construction live loads to be placed thereon, without damage to the structure. In general, do not disturb forms for framing until the concrete has attained at least 40% of design strength for side forms and 80% of design strength for bottom forms. Be responsible for proper form removal and replace any work damaged due to inadequate maintenance or improper or premature form removal.

B. Where use of metal form ties extending to within less than 1-1/2 inches of the face of permanently exposed concrete has been unavoidable, cut off such ties at least 1-1/2 inches deep in the concrete, but not less than 72 hours after concrete has been cast. Remove forms by methods which will not spall the concrete or cause any injury whatsoever. Hammering or prying against concrete will not be permitted.

C. Forms may be removed at the following minimum times, which shall be subject to any other requirements of the Architect.

*Over 95oF 70-95oF 60-70oF 50-60oF Below 50oF

Walls 5 days 1-1/2 2 days 3 days Do not remove
days until site cured

test cylinders**

develop 50% of

28 day strength

*Over 95oF 70-95oF 60-70oF 50-60oF Below 50oF

Isolated

Piers & 7 days 2 days 3 days 4 days

Columns

Bottom of

Beams & 10 days 4 days 5 days 6 days

Slabs

* Where exposed surfaces of concrete can be effectively sealed to prevent loss of water, the 95oF times may be cut in half.

** Additional cylinders taken to facilitate form stripping shall be at the

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Contractor's expense.

3.09 REPAIR OF DEFECTIVE AREAS

A. With prior approval of the Engineer, as to method and procedure, all repairs of defective areas shall conform to ACI 301, Chapter 5, paragraph 5.3.7, except that the specified bonding compound must be used.

B. The specified patching mortars may be used in lieu of the abovementioned method when color match of the adjacent concrete is not required. Prior approval by the Engineer is required.

C. All structural repairs shall be made with prior approval of the Engineer, as to method and procedures, using the specified epoxy adhesive and/or epoxy mortar. Where epoxy injection procedures must be used, an approved low viscosity epoxy made by the manufacturers previously specified shall be used.

D. Leveling of floors for subsequent finishes shall be achieved by use of the specified underlayment material.

E. All exposed floors shall be leveled, where required, with the specified selfleveling repair topping.

3.10 FINISHING

A. Place, consolidate, strike off and level concrete slab to prior elevation.

B. Any finishing operation shall not be done until all bleeding water and excess moisture have left or been removed from the surface.

C. Edging: Use proper edge to form a radius at the edge of slab for sidewalks, driveways and steps. If the floor is to be covered with tile an edger should not be used.

D. The slab on grade shall be saw cut unless covered with a subsequent finish. The Soff-Cut saw shall be used immediately after final finishing and to a depth of 1 1/4". A conventional saw shall be used as soon as possible without dislodging aggregate and to a depth of 1/4 slab thickness.

E. Floating: After the concrete has stiffened sufficiently to permit the operation, and water sheen has disappeared, the surface shall be floated, at least twice, to a uniform sandy texture. Use a troweling machine with float blades.

F. Troweling: It shall be done immediately following floating to produce a smooth, hard surface. No troweling shall be done to a surface which has not been floated by power or by hand. The surface shall be troweled, at least twice, to a smooth dense finish.

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G. Finishing Class 1 floors (residential and tile covered): The placing and finishing operations described under 3.05 and 3.09 A to F should be followed. Two trowelings are required.

H. Finishing Class 2 and Class 3 floors and slabs (offices, garages, drives and walks): The placing and finishing operations described under 3.05 and 3.09 A to

F should be followed. Two trowelings are required. For non-slip finish follow procedure described in 3.09I.

I. Non-Slip Floor: Non-slip surfaces shall be swirl or broom design. The swirl design shall be produced by magnesium or aluminum float, steel finishing trowel or soft-bristled broom. Texture shall be as approved by the Architect from sample panels. These surfaces shall be cured as soon as possible without marring the surface by use of the specified curing compound or a continuous moist curing method approved by the Architect.

J. Monolithic surface treatments for wear resistance: Application and finishing of materials should follow these basic procedures:

1. Following screeding and bull floating, and after all free water has evaporated or been removed, float all surfaces by hand wood and/or power floats.
2. Evenly distribute approximately 2/3 of the amount specified for the area immediately behind the floating as it proceeds.
3. As soon as the material darkens slightly from absorbed moisture, it should be floated using hand wood floats and/or power floats.
4. Immediately apply the remaining 1/3 of the specified amount at right angles to the first application.
5. Float as in 3 above.
6. Apply a flat troweling by hand or power.
7. Apply a first raised troweling and successive troweling as required to produce a smooth, dense, wear resistance surface.
8. Burnish (hard) trowel.
9. Cure immediately after finishing following the material manufacturer's printed recommendations or directions.

K. Finishing of Formed Surfaces:

1. Rough Finish - No specific requirements for surface finish other than form and tie removal and repair of voids affecting structural integrity of element involved. Use at all locations not exposed to view. Surfaces to be membrane waterproofed shall have projections or fins of 1/4 inch removed.
2. Standard Finish - Reasonably true to line and plane. Patch tie holes and defects. Fill voids and pin holes over 3/8 inch diameter. Rub or grind down fins exceeding 1/8 inch height. Otherwise leave surfaces semiSt. rough with texture imparted by forms. Use on all interior surfaces exposed to view.

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3.11 CONCRETE FILL

A. Install concrete fill on a continuous wire mesh of not less than 14 gage welded wire fabric, 2 inches square, supported approximately 1/2 inch above the bottom of pans. screed concrete fill level and finish with wood float.

B. After screeding the concrete finish level, permit it to stand until it will bear weight of workmen standing on boards. At this time the abrasive aggregate having previously been soaked in clean water for about ten minutes, shall be sprinkled uniformly on the surface and immediately wood floated into the concrete finish. The surface shall then be troweled to a smooth dense finish.

3.12 FLOOR SLABS ON GRADE

A. Examine condition of porous fill and remedy any unsatisfactory portions before applying vapor barrier.

B. Cover porous fill with vapor barrier of polyethylene sheeting. Do not lay sheeting until immediately prior to placing of the reinforcing mesh and concrete, in order to prevent damage to the film. Seal seams as recommended by the manufacturer. Note areas to receive 3 in. of approved damp compactible fill before placing new concrete.

C. Do not place concrete over vapor barrier until all breaks have been patched and sealed.

3.13 NON-SHRINK GROUT

A. All column base plates, leveling plates, equipment base plates and other locations noted on the drawings shall use the specified non-shrink, non-metallic grout.

B. Where fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than 10 sq. ft.

C. Place grout so as to ensure complete bearing and elimination of air pockets.

3.14 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.
2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

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B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified.

1. Provide moisture curing by following methods.
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Covering concrete surface with specified absorptive cover thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges with 4" lap over adjacent absorptive covers.
2. Provide moisture-cover curing as follows:
 - a. Covering concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover.
3. Provide curing compound to all exposed interior slabs and troweled slabs receiving mastic applied adhesives or mineral aggregate hardeners shall be cured with the curing and sealing compounds. Exterior slabs, sidewalks, curbs, and architectural concrete, not receiving a penetrating sealer, shall be cured with the specified clear, non-yellowing curing and sealing compound as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by powerspray or roller in accordance with manufacturer's directions. Recoat areas after initial application. Maintain continuity of coating and repair damage during curing period.
 - b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener waterproofing, damp-proofing, membrane roofing, flooring, painting, and other coatings and finish material, unless otherwise acceptable to Architect.
 - c. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
 - d. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, broom topping, and other flat surfaces by application of the specified curing and sealing compound or continuous moist curing method.
 - e. All surfaces receiving a penetrating sealer shall be cured by a continuous moist curing method approved by the Architect.

3.15 MISCELLANEOUS CONCRETE ITEMS:

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

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

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings and if not shown as required by mechanical equipment being supported. Set anchor bolts for machine and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.

E. Reinforcement Masonry: Provide concrete grout for reinforced masonry lintels and bond beams were indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

F. Dovetail Anchor Slots for bonding shall be provided vertically in concrete walls where masonry walls abut concrete work. Slots shall be galvanized sheet metal standard dovetail slots, filled to prevent mortar from entering slot. Slots shall extend the full height of the masonry.

G. Slots, Recesses, Sleeves: This Contractor shall cooperate with and coordinate all other trades in the forming and setting of slots, recesses, chases, sleeves, inserts, bolts, hangers, etc. of other trades not in this Section of the work. All slots, etc., shall be so located as not to infringe on or impair the strength of any structural member, unless approved by the Engineer. The Contractor shall be responsible for using proper care in the placing of the concrete so far as not to dislodge or dislocate embedded items of other trades.

3.16 UNIT PRICES

A. Concrete: Concrete in place indicating reinforcement, proportioned and finished as specified, including forms:

1. Footings \$ /cu. yd
2. Walls \$ /cu. yd
3. Columns \$ /cu. yd
4. Framed slabs/beams \$ /cu. yd
5. Pedestals/Pilasters \$ /cu. yd

3.17 QUALITY CONTROL TESTING DURING CONSTRUCTION

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A. The Owner will employ a New York City Department of Buildings certified Special Inspection Agency to perform special inspections, as required by Section 1704.4 of the 2008 NYC BC, and to submit test reports.

B. Sampling Fresh Concrete: ASTM C-172, except modified for slump to comply with ASTM C-94.

C. Sampling and testing for quality control during placement of concrete shall include the following:

1. Slump: ASTM C-143; one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.
2. Air Content: ASTM C-173; volumetric method for lightweight or normal weight concrete or ASTM C-231 for normal weight concrete; one for each set of compressive strength test specimens. Chace Air Indicator is not permitted.
3. Concrete Temperature: Test hourly when air temperature is 40oF (4oC) and below, and when 80oF (27oC) and above; and each time a set of compression test specimens made.
4. Compression Test Specimens: ASTM C-31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required.
5. Compressive Strength Tests: ASTM C-39; one set for each 50 cu. yds. or fraction thereof, of each concrete class placed in any one day, 1 specimen tested at 7 days, 3 specimens tested at 28 days.
 - a. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
6. Compressive Test Results: Test of concrete will be deemed satisfactory if the average of all tests representing one class is equal to or greater than the design strength, and if the following additional conditions are met; however, the number of tests on a given class must be great enough to permit application of these additional conditions:
 - a. No single test shall be greater than 500 psi below the specified design strength.
 - b. The average of any two consecutive test shall not be less than 93% of the design strength.
 - c. The average of any three consecutive tests shall not be less than the design strength.
 - d. The number of tests below the design strength shall not exceed 20% of the total number of tests.
 - e. No more than two consecutive tests shall be below the design strength.

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END OF SECTION 033000

SECTION 042000 - Unit Masonry Assemblies

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Concrete masonry units.
2. Mortar and grout for unit masonry, manufactured stone veneer and cast stone.
3. Reinforcing steel.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

B. Related Sections include the following:

1. Division 7 Section "Firestopping" for firestopping at tops of masonry walls and at openings in masonry walls.

C. Products furnished, but not installed, under this Section include the following:

1. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 5 Section "Structural Steel."

D. Products installed, but not furnished, under this Section include the following:

1. Steel lintels for unit masonry, furnished under Division 5 Section "Metal Fabrications."
2. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section "Steel Doors and Frames."

1.2 DEFINITIONS

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

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for the following:

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

B. Product Data: For each different masonry unit, accessory, and other manufactured product specified.

C. Samples for Initial Selection: For the following:

1. Colored mortar samples in small-scale form showing the full range of colors and textures available for each different exposed mortar color required.

D. Samples for Verification: For the following:

1. For each mortar color required, showing the full range expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label samples to indicate type and amount of colorant used.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

F. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

1. Each type of masonry unit required.
2. Mortar complying with property requirements of ASTM C 270.
3. Grout mixes complying with compressive strength requirements of ASTM C 476.
4. Include description of type and proportions of grout ingredients.

G. 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
1. manufacturer, brand, type, and weight slips at time of delivery.
2. Each material and grade indicated for reinforcing bars.
3. Each type and size of joint reinforcement.
4. Each type and size of anchor, tie, and metal accessory.

1.4 QUALITY ASSURANCE

A. Masonry Standard: Comply with requirements of "Specifications for Masonry Structures, ACI 530.1-95/ASCE 6-95/TSM 602-95" published by the American Concrete Institute, except when more stringent requirements are specified and as modified by the requirements of these Contract Documents.

1. Revise ACI 530.1/ASCE 6/TSM 602 to exclude Section 1.5; Part 3.3 E.; Articles 1.1 C.1, 1.1 C.2, 1.1 C.3., 3.3 D.1., 3.3 D.2., 3.3 D.3, 3.3 D.4., 3.3 D.5.; and modify Article 1.1.5., by deleting requirement for installing vent pipes and conduits built into masonry.

B. Installer Qualifications: Engage an experienced installer who has 10 years experience as a journeymen mason, and who has completed masonry similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1. A minimum of one skilled journeyman mason shall be present at all times during masonry erection and shall personally direct the work.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.

D. 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.

E. 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.

- F. 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.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver 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.

1.6 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. 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.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in Part 1.8 C. OF ACI 530.1/ASCE 6/TMS 602.
1. Do not lay masonry units that are wet or frozen.

2. Remove masonry damaged by freezing conditions.

D. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) 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. Comply with cold-weather construction requirements contained in Part 1.8 D. of ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 100 deg F (38 deg C), or 90 deg F (32 deg C) with a wind velocity greater than 8 mph (13 km/h), do not spread mortar beds more than 48 inches (1200 mm) 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 that are exposed to view, unless otherwise indicated.

B. Fire-Rated Assemblies: Provide U.L. classified units for rated walls, or units meeting the fire resistance ratings by equivalent concrete masonry thickness.

C. Concrete Masonry Units: ASTM C 90 with minimum average net-area compressive strength of 1900 psi (13.1 MPa); normal weight, unless otherwise indicated; and as follows:

1. Size: Manufactured to the following dimensions: 16 inches (407 mm) by 8 inches (203 mm) nominal; 7-5/8 inches (194 mm) by 15-5/8 inches (397 mm) actual; by thickness indicated.
2. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

2.2 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.

1. For concrete block work, provide natural color cement.
2. For manufactured stone work and setting cast stone units, provide natural color or white cement as required to produce required mortar color.

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. Masonry Cement: Not permitted.

E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.

1. For colored mortar, provide natural 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, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

H. Water: Potable.

2.3 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 (Grade 400).

2.4 MASONRY JOINT REINFORCEMENT

A. General: ASTM A 951 and as follows:

1. Hot-dip galvanized, carbon-steel wire for all locations.
2. Wire Size for Side Rods: W1.7 or 0.148-inch (3.8-mm) diameter.
3. Wire Size for Cross Rods: W1.7 or 0.148-inch (3.8-mm) diameter.
4. Provide in lengths of not less than 10 feet (3 m), 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 (407 mm) o.c.

2.5 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. Mill Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 641 (ASTM A 641M), Class 1 coating.

C. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.

D. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.6 BENT WIRE TIES

A. General: Rectangular units with closed ends and not less than 4 inches (100 mm) wide. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches (50 mm) long may be used for masonry constructed from solid units or hollow units laid with cells horizontal.

B. Wire: Fabricate from 1/4-inch- (6.4-mm-) diameter, hot-dip galvanized steel wire.

2.7 JOINT STABILIZATION ANCHORS

A. General: Contractor's option to select between the two types listed below.

B. Three-piece assemblies allowing movement at expansion, contraction or isolation joint while maintaining wall alignment in direction normal to the movement. Two 3/16-inch (4.8-mm) diameter wire rods with plastic sleeves separating two 1/32-inch (0.8-mm) sheet metal sleeves for embedding completely in mortar, zinc plated; Dur-O-Wal D/A 2200 or equivalent.

C. Galvanized 3/8-inch (9-mm) by 6 inches (150 mm) steel dowel vertically welded to a 2-inch (50-mm) by 5-inch (125-mm) steel plate with slotted holes for mounting to the underside of beams or deck, and a plastic sleeve with compressible filler to prevent dowel from bonding with mortar; Dur-O-Wal D/A 411, or Hohmann & Barnard PTA-420 with tube.

2.8 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME

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: Crimped 1/4-inch- (6.4-mm-) diameter, hot-dip galvanized steel anchor section for welding to steel.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.1875-inch- (4.8-mm-) hot-dip galvanized steel.

2.9 RIGID ANCHORS

A. General: Fabricate from steel bars as follows:

1. 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.
2. Finish: Hot-dip galvanized to comply with ASTM A 153.

2.10 MISCELLANEOUS ANCHORS

A. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:

1. Headed bolts.

B. MISCELLANEOUS MASONRY ACCESSORIES

C. 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.

D. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated, or required.

1. Styrene-Butadiene-Rubber Compound: ASTM D 2000, Designation M2AA-805.

E. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.11 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of 1/2-cup (0.14-L) dry measure tetrasodium polyphosphate and 1/2-cup (0.14-L) dry measure laundry detergent dissolved in 1 gal. (4 L) of water.

1. All cleaning agents for glazed face block shall be approved by manufacturer of block. Cleaners containing acids and abrasives shall not be permitted.

2.12 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.

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. Colored Mortar for Manufactured Stone Veneer and Cast Stone Units: Produce mortar of color and texture to match approved samples and mock-ups by using selected ingredients. Do not alter specified proportions without Architect's approval.

1. Use naturally colored aggregates to produce required mortar color to greatest extent possible, before adding pigments.
2. Pigments: Where mortar pigments are used, do not exceed a pigment-to-cement ratio of 1:10 by weight

D. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.

1. Limit cementitious materials in mortar to portland cement and lime.
2. For reinforced masonry and where indicated, use Type S.
3. For interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
4. For manufactured masonry, in specific applications as called out in Section 04730, use Type M.

E. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.

2. Verify that foundations are within tolerances specified.

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

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

A. Thickness: 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, un-chipped 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

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

B. 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 (6 mm in 6 m), nor 1/2 inch (12 mm) maximum.

C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), nor 1/2 inch (12 mm) maximum.

D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, and stone trim, the following tolerances will apply.

1. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.

2. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.

3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.

4. Variation in Plane between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch

(1.5-mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).

F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in running bond pattern unless otherwise indicated; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. 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.

E. 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.

F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.

G. 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.

H. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.

2. At fire-rated partitions, 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

A. 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.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

3.6 MASONRY JOINT REINFORCEMENT

A. 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 (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.

2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings.

a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. 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.

3.7 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch (25 mm) in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.

2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.

3. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 16 inches (406 mm) o.c. horizontally, with not less than 1 anchor for each 1.77 sq. ft. (0.16 sq. m) of wall area.

3.8 CONTROL AND EXPANSION JOINTS

A. 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.

B. Form control joints in concrete masonry with preformed control-joint gaskets designed to fit standard sash block..

C. 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."

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.

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.

C. Provide minimum bearing of 8 inches (200 mm) at each jamb, unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. General: Provide reinforced unit masonry walls at all elevator shafts, and other walls as indicated.

B. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout.

Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

C. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

1. At elevator walls, place #4 bars at each corner and at 2'-0" o.c. in walls.

2. Install in bond beams at every floor.

D. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

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

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

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. 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.

3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly

by rinsing the surfaces thoroughly with clear water.

4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

END OF SECTION 042000

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SECTION 054000 - Cold Formed Metal Framing

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within

DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Interior non-load-bearing wall framing.

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

1. Section 055000 - METAL FABRICATIONS for masonry shelf angles and connections.
2. Section 092900 – GYPSUM BOARD ASSEMBLIES for gypsum sheathing on cold-formed metal framing.
3. Section 092900 - GYPSUM BOARD ASSEMBLIES for interior non-load-bearing, metal stud framing and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design framing, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As required by code.
2. Deflection Limits: Design framing systems to withstand design loads within deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: (see Nucor or equal system specifications)
 - 1) Horizontal deflection of $l/240$ of the wall height for metal panel systems. (as per NYS code)
 - 2) Horizontal deflection of $1/600$ of the wall height for masonry systems. (as per NYS code)
3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load, plus superimposed dead load, deflection of primary building structure.

C. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.4 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in the jurisdiction where Project is located responsible for their preparation.
- C. Delegated-Design Submittal: For framing indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Welding certificates.
- E. Qualification Data: For professional engineer.
- F. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
1. Steel sheet.
 2. Expansion anchors.
 3. Power-actuated anchors.
 4. Mechanical fasteners.
 5. Vertical deflection clips.
 6. Miscellaneous structural clips and accessories.

1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the 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 cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- C. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.
- D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
 2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in

Division 01.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering coldformed metal framing that may be incorporated into the Work include, but are not limited to, the following:

1. Clark Steel Framing.
2. Consolidated Fabricators Corp.; Building Products Division.
3. Dietrich Metal Framing; a Worthington Industries Company.
4. MarinoWare; a division of Ware Industries.
5. Super Stud Building Products Inc.

2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G90.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G90 (Z275).

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch (16 gauge).

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

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. Dietrich Metal Framing; a Worthington Industries Company.
- b. MarinoWare, a division of Ware Industries.

c. The Steel Network, Inc.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated.

C. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch and depth required to fit insulation thickness indicated.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, threaded carbon-steel bolts, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Acceptable Manufacturers: Kwik-Bolt 3 by Hilti, Inc., TruBolt Wedge Anchor by ITW Red Head or Power-Stud by Powers Fasteners.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035 or ASTM A 780.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of

sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - Metal Fabrications

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Loose steel lintels.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.

1.2 SUBMITTALS

A. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. Welding Certificates: Copies of certificates for welding procedures and personnel.

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.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. 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 metal stairs (including handrails and railing systems) that are similar to those indicated for this Project in material, design, and extent.

C. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."
3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.4 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify 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 metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.5 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. 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.

1.6 SEQUENCING AND SCHEDULING

A. Sequence and coordinate installation of wall handrails as follows:

1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.
2. Mount handrails only on gypsum board assemblies reinforced to receive anchors, and where the location of concealed anchor plates has been clearly marked for benefit of Installer.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: For metal fabrications 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.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating.

C. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads. For exterior installations and where indicated, provide pipe with hot-dip galvanized coating.

D. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch- (14.3-mm-) wide slotted holes in webs at 2 inches (51 mm) o.c.

1. Width of Channels: 1-5/8 inches (41 mm).
2. Depth of Channels: As indicated.
3. Metal and Thickness: Galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108-inch (2.8-mm) nominal thickness.
4. Finish: Unfinished.

E. Steel Bars for Gratings: ASTM A 36/A 36M.

F. Wire Rod for Grating Crossbars: (ASTM A 510M)

G. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).

H. Gray-Iron Castings: ASTM A 48, Class 30 (ASTM A 48M, Class 200), unless another class is indicated or required by structural loads.

I. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

J. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded

2.3 ALUMINUM

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T6, 6036-T5, 6005-T5 or 6061-T6.

B. Extruded Structural Pipe: ASTM B 429, Alloy 6063-T6.

1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated

C. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

D. Extruded Bars, Shapes and Mouldings: ASTM B 221 (ASTM B 221M), alloy 6063-T6 or 6063-T52.

E. Castings: ASTM B 26, Almag 35.

2.4 PAINT

A. Shop Primer for Ferrous Metal: Modified oil-alkyd primer, Tnemec 88-559 or 10-1009, or equivalent. Primer shall be compatible with finish paint specified in Section 09900.

B. Shop Primer for Galvanized Ferrous Metal: Polyamide epoxy primer, Tnemec F.C. Typoxy Series 27, or equivalent. Primer shall be compatible with finish paint specified in Section 09900.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

D. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat; Tnemec-Zinc 90-97; Tnemec Company, Inc.

E. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with

ASTM D 1187.

2.5 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls, except as noted below. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

D. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.

G. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).

H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1 (ASME B18.21.2M).

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.6 LOOSE STEEL LINTELS

A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches (200 mm), unless otherwise indicated.

D. Galvanize loose steel lintels located in exterior walls.

E. Shop prime and field paint all lintels, leave embedded portions of lintels unpainted.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel

framework as necessary to complete the Work.

B. Fabricate units from structural-steel shapes, plates, tubes, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate units from slotted channel framing where indicated.
2. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long at 24 inches (600 mm) o.c., unless otherwise indicated.
3. Furnish inserts if units must be installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated, and in exterior locations.

2.8 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches (150 mm) from each end, 6 inches (150 mm) from corners, and 24 inches (600 mm) o.c., unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and

corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated at girders supported on concrete or masonry, install as specified above for setting and grouting bearing and leveling plates.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

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SECTION 061053 - Miscellaneous Carpentry

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wood blocking, cants, and nailers and fire treated framing.
2. Plywood sheathing.
3. Plywood backing panels.
4. Air infiltration barrier – see insulation specification.

1.2 DEFINITIONS

A. 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.

1.3 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.
5. For proprietary building-wrap air-infiltration barrier, include data substantiating compliance with building code in effect for Project.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood and FRT treated in contact with concrete.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.

5. Expansion anchors.
6. Metal framing anchors.

1.4 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.
- B. Do not leave air-infiltration barrier exposed to weather for more than 120 days.

PART 2 - PRODUCTS

2.1 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 (38-mm actual) thickness or less, unless otherwise indicated.
- B. Wood Structural Panels:
1. Plywood: DOC PS 1.
 2. Oriented Strand Board: DOC PS 2.
 3. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
 4. Comply with "Code Plus" provisions in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."
 5. Factory mark panels according to indicated standard.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
1. Provide one of the following borate (SBX) preservative products with a retention level of .42 pcf DOT, or equal:
 - a. Frame Guard by Arch Wood Protection, Inc.
 - b. Advance Guard Borate PTW by Osmose.
 2. The use of CCA preservative treated wood is prohibited.
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material
- C. Mark each treated item with treatment quality mark of an inspection agency approved by

the American Lumber Standards Committee Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, sheathing, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches (460 mm) above grade.
4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWWPA C20 (lumber) and AWWPA 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 Exterior type for exterior locations and where indicated.
4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.4 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:

1. Stud Framing, Joists and Rafters, Blocking and plywood.
2. Cants.
3. Nailers.
4. Grounds.

B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:

1. Mixed southern pine; SPIB.
2. Eastern softwoods; NELMA.
3. Northern species; NLGA.
4. Western woods; WCLIB or WWPA.

C. For concealed boards, provide fire-treated lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NELMA.
3. Northern species, No. 2 Common grade; NLGA.
4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.5 PANEL PRODUCTS

A. Miscellaneous Concealed Plywood: Exposure 1 sheathing, span rating to suit framing in each location, and thickness as indicated but not less than ½ inch (13 mm).

1. Provide preservative-treated panels for exterior locations unless indicated.

2.6 ACCESSORY MATERIALS

A. Weather Resistant Barrier: Asphalt-saturated organic felt, ASTM D 226, Type 1 (No. 15 asphalt felt), unperforated.

2.7 AIR-INFILTRATION BARRIER

A. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; and UV stabilized.

1. Polyethylene sheet; 0.0038 to 0.0064-inch (0.097 to 0.163 mm) thick; formed by spinning continuous strands of fine, high-density-polyethylene interconnected fibers and bonding them together by heat and pressure; incorporating an additive to provide ultraviolet light resistance for up to 120 days; and with a water-vapor transmission rate equaling 200 g through 1 sq. m of surface in 24 hours according to ASTM E 96, Desiccant Method (Method A).

- a. Available Products: DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap, or approved equivalent.

2.8 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where 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, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

F. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) 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.

2.9 TAPES AND ADHESIVES

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

B. Air-infiltration Barrier Tape:

1. For taping seams in building wrap provide oriented polypropylene film coated with a permanent acrylic adhesive; DuPont Contractor Tape, or approved equivalent.
2. For flashing tape at windows and doors refer to Division 7 Section "Siding".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

C. Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

E. Countersink fastener heads on exposed carpentry work and fill holes with wood filler.

F. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

3.2 PANEL PRODUCT INSTALLATION

A. Wood Structural Panels: Comply with applicable recommendations contained in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Miscellaneous Concealed Plywood Panels: Nail to wood supports.
2. Plywood Backing Panels: Nail to wood supports
3. Subflooring: Glue and nail to wood framing.
4. Roof and Wall Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Screw to cold-formed metal framing
 - c. Space panels 1/8 inch (3 mm) apart at edges and ends

3.3 WOOD 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.

END OF SECTION 061053

SECTION 062023 - Interior Finish Carpentry

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Wood cabinets and casework.
 2. Plastic-laminate cabinets and casework.
 3. Plastic-laminate countertops.

1.2 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.

1.3 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 details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. 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, 50 sq. in. (300 sq. cm), for each species and cut, finished on 1 side and 1 edge.
2. Wood-veneer-faced panel products with or for transparent finish, 8 by 10 inches (200 by 250 mm), for each species and cut. Include at least one face-veneer seam and finish as specified.
3. Plastic-laminate-clad panel products, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.
4. Corner pieces as follows:
 - a. Cabinet front frame joints between stiles and rail, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.

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.

1.4 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. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork.

C. 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 certificate indicating that woodwork complies with requirements of grades specified.

D. 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.

1.5 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.

1.6 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.

1.7 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 MANUFACTURERS

A. Casework

1. Bertch – see documents for plans, elevations, details and finish schedule

2.2 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: As specified or indicated on drawings for each specific location.

C. Wood Species and Cut for Opaque Finish: Clear Pine, Select Grade, no fingerjoints.

D. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD-Exterior Glue.
3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
5. Hardwood Plywood and Face Veneers: HPVA HP-1.

E. 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. International Paper; Decorative Products Div.
- c. Laminart.
- d. Pioneer Plastics Corp.
- e. Westinghouse Electric Corp.; Specialty Products Div.
- f. Wilsonart International; Div. of Premark International, Inc.

F. Adhesive for Bonding Plastic Laminate: Contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where indicated, 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.

C. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread rating of 25 or less and smoke-developed rating of 25 or less per ASTM E 84.

1. For panels 3/4 inch (19 mm) thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: density, 45-lb/cu. ft (720-kg/cu. m); modulus of rupture, 1600 psi (11 MPa); modulus of elasticity, 300,000 psi (2000 MPa); internal bond, 80 psi (550 kPa); and screw-holding capacity on face and edge, 250 lbf (1100 N) and 225 lbf (1000 N), respectively.
2. For panels 13/16 to 1-1/4 inches (20 to 32 mm) thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: density, 44-lb/cu. ft (705-kg/cu. m); modulus of rupture, 1300 psi (9 MPa); modulus of elasticity, 250,000 psi (1700 MPa); linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 lbf (1100 N) and 175 lbf (780 N), respectively.
3. Product: Subject to compliance with requirements, provide "Duraf Flake FR" by Willamette Industries, Inc.

D. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread rating of 25 or less and smoke-developed rating of 200 or less per ASTM E 84.

1. Product: Subject to compliance with requirements, provide "Medite FR" by SierraPine Ltd; Medite Div.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets as selected by Architect from manufacturer's standards.

2.5 ACCESSORIES

A. Shelving: 3/4-inch (19-mm) particleboard shelving with radiused and filled front edge.

1. Provide wood veneered panel product where indicated on drawings.
2. Provide plastic laminate faced panel product where indicated on drawings.

B. Midshelf and Closet Rod Support: Combination bracket to support shelf and closet rod; for locations with hook strip Stanley #19-2999, for locations without hook strip Stanley #7046.

C. Adjustable Shelf Supports: Pilaster type, zinc plated steel, 5/8" wide by 3/16" high, adjustable on 1/2" centers, with clips; Knap & Vogt KV-255 and KV-256, or equivalent

2.6 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

2.7 FABRICATION, GENERAL

A. Interior Woodwork Grade: Provide Premium 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 and Rails: 1/16 inch (1.5 mm)

E. Complete fabrication, including assembly, 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.

2.8 INTERIOR WOOD TRIM AND RAILS, AND WINDOW STOOLS

A. Quality Standard: Comply with AWI Section 300.

B. Grade:

1. Premium, for transparent finish items.

C. For trim 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

E. Assemble casings in plant except where limitations of access to place of installation require field assembly.

F. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

G. Products: Provide profiles indicated on drawings from Interstate.

2.9 WOOD CABINETS AND CASEWORK FOR TRANSPARENT FINISH

A. Quality Standard: Comply with AWI Section 1600 requirements for modular wood cabinets.

B. AWI Type of Cabinet Construction: As indicated on drawings.

C. Products: TBD

2.10 PLASTIC-LAMINATE CABINETS AND CASEWORK

A. Quality Standard: Comply with AWI Section 1600 requirements for modular laminate cabinets.

B. AWI Type of Cabinet Construction: As indicated on drawings.

C. Products: TBD

2.11 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.

B. Grade: Premium.

C. High-Pressure Decorative Laminate Grade: HGS.

D. Colors, Patterns, and Finishes: As selected by Architect from manufacturer's standards.

E. Edge Treatment: Same as laminate cladding on horizontal surfaces.

F. Core Material: Particleboard or medium-density fiberboard.

G. Core Material at Sinks: Particleboard made with exterior glue, or medium-density fiberboard made with exterior glue

2.12 SHOP FINISHING

A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.

1. Grade: Provide finishes of same grades as items to be finished.

B. General:

1. Finish all transparent finished architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
2. Shop prime and backprime all items of opaque finished architectural woodwork at fabrication shop before shipment to site; comply with requirements of Section 09900 for preparation and priming of wood.

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. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.

D. Transparent Finish: Provide manufacturer's standard finish for modular wood cabinets. For other woodwork for 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. AWI Finish System TR-6: Catalyzed polyurethane.
2. Staining: As selected by Architect.
3. Wash Coat for Stained Finish: Apply a vinyl wash coat to woodwork made from closed-grain wood before staining and finishing.
4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
5. Sheen: Satin.

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 (3 mm in 2400 mm).

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. Wood 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 36 inches (900 mm) long, except where shorter single-length pieces are necessary.

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 trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).

G. 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 (3 mm in 2400-mm) 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 (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish

H. 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 (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c.
3. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

I. Handrails: Support wall railings on indicated metal brackets securely fastened to wall framing.

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.

K. Refer to Division 9 Sections for final finishing of opaque-finished architectural woodwork.

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 semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 062023

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SECTION 066116 - Solid Surface Fabrications

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes stone countertops.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Quartz
2. Stone/Marble accessories and other manufactured products.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Samples for Verification:

1. For each stone type indicated, in sets of Samples not less than 12 inches (300 mm) square. Include two or more Samples in each set and show the full range of variations in appearance characteristics expected in completed Work.

D. Qualification Data: For fabricator.

E. Sealant Compatibility Test Report: From sealant manufacturer, complying with requirements in Division 7 Section "Joint Sealants" and indicating that sealants will not stain or damage stone.

F. Maintenance Data: For stone countertops to include in maintenance manuals. Include Product Data for stone-care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate stone countertops similar to that indicated for this Project and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of products.

C. Source Limitations for Stone: Obtain each variety of stone from a single quarry with resources to provide materials of consistent quality in appearance and physical properties.

1. Obtain each variety of stone from a single quarry, whether specified in this Section or in another Section of the Specifications.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.

B. Store stone on wood A-frames or pallets with nonstaining separators and nonstaining,

waterproof covers. Ventilate under covers to prevent condensation.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication

PART 2 - PRODUCTS

2.1 STONE/QUARTS – AS PER DETAILS ON DOCUMENTS AND FINISH SCHEDULE

A. Varieties and Sources: Provide the following: TBD

B. Cut stone from contiguous, matched slabs in which natural markings occur.

C. Finish: Match Architect's sample.

2.2 ADHESIVES, GROUT, SEALANTS, AND STONE ACCESSORIES

A. General: Use only adhesives formulated for stone and ceramic tile and recommended by their manufacturer for the application indicated.

B. Water-Cleanable Epoxy Adhesive: ANSI A118.3.

1. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. Laticrete International, Inc.
- b. MAPEI Corp.

C. Water-Cleanable Epoxy Grout: ANSI A118.3, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.

1. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. Laticrete International, Inc.
- b. MAPEI Corp.

D. Stone/ Quartz Cleaner: Cleaner specifically formulated for stone types, finishes, and applications

indicated, as recommended by stone producer and, if a sealer is specified, by sealer manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

F. Stone/ Quartz Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

1. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. Hillyard, Inc.
- b. Miracle Sealants Company.
- c. Stone Care International Inc.

2.3 STONE/QUARTS FABRICATION, GENERAL

- A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.
1. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically unpleasing, as judged by Architect.
- B. Grade and mark stone for final locations to produce assembled countertop units with an overall uniform appearance.
- C. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
 2. For marble, comply with recommendations in MIA's "Dimension Stone--Design Manual."
 3. Clean sawed backs of stones to remove rust stains and iron particles.
 4. Dress joints straight and at right angle to face, unless otherwise indicated.
 5. Cut and drill sinkages and holes in stone for anchors, supports, and attachments.
 6. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
 7. Fabricate molded edges with machines having abrasive shaping wheels made to reverse contour of edge profile to produce uniform shape throughout entire length of edge and with precisely formed arris slightly eased to prevent snipping, and matched at joints between units. Form corners of molded edges as indicated with outside corners slightly eased, unless otherwise indicated.
 8. Finish exposed faces of stone to comply with requirements indicated for finish of each type of stone required and to match approved Samples and mockups. Provide matching finish on exposed edges of countertops, splashes, and cutouts.
- D. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

2.4 STONE/QUARTS COUNTERTOPS

- A. General: Comply with recommendations in MIA's "Dimension Stone - Design Manual."
- B. Nominal Thickness: Provide thickness indicated. Gage backs to provide units of identical thickness.
- C. Edge Detail: As indicated.
- D. Splashes: Provide 3/4-inch- (20-mm-) thick backsplashes and end splashes, unless otherwise indicated.
1. Height: As indicated.
 2. Top-Edge Detail: As indicated.
- E. Joints: Fabricate countertops without joints, to greatest extent possible. Where not possible fabricate countertops in sections for joining in field, with joints at locations indicated and as follows:
1. Grouted Joints: 1/16 inch (1.5 mm) in width.

2. Sealant-Filled Joints: 1/16 inch (1.5 mm) in width.

F. Cutouts and Holes:

1. Undercounter Fixtures: Make cutouts for undercounter fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch (5 mm) into fixture opening.
 - b. Provide vertical edges, rounded to 3/8-inch (10-mm) radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch (5 mm) into fixture opening.
 - c. Provide 3/4-inch (20-mm) full bullnose edges projecting 3/8 inch (10 mm) into fixture opening.
2. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates indicated to receive stone countertops and conditions under which stone countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone countertops.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by stone countertop Installer for anchoring stone countertops. Furnish installers of other work with Drawings or templates showing locations of these items.

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

3.3 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/16 inch in 48 inches (1.5 mm in 1200 mm).

B. Variation from Level: Do not exceed 1/8 inch in 96 inches (3 mm in 2400 mm), 1/4 inch (6 mm) maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/4 of nominal joint width.

D. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.

E. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch (0.4-mm) difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION OF COUNTERTOPS

A. General: Install countertops by adhering to supports with water-cleanable epoxy adhesive.

B. Do not cut stone in field, unless otherwise indicated. If stone countertops or splashes require additional fabrication not specified to be performed at Project site, return to fabrication shop for adjustment.

C. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight, true, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

D. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and other attachments indicated or necessary to secure stone countertops in place.

E. Bond joints with stone adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

F. Space joints with 1/16-inch (1.5-mm) gap for filling with grout . Use temporary shims to ensure uniform spacing.

1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

G. Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive. Leave 1/16-inch (1.5-mm) gap between countertop and splash for filling with sealant. Use temporary shims to ensure uniform spacing.

H. Grout joints to comply with ANSI A108.10. Remove temporary shims before grouting. Tool grout uniformly and smoothly with plastic tool.

I. Apply sealant to joints and gaps specified for filling with sealant; comply with Division 7 Section "Joint Sealants." Remove temporary shims before applying sealant.

3.5 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.

B. Remove and replace stone countertops of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.

2. Defective countertops.
3. Defective joints, including misaligned joints.
4. Interior stone countertops and joints not matching approved Samples and mockups.
5. Interior stone countertops not complying with other requirements indicated.

C. Replace in a manner that results in stone countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

D. Clean stone countertops not less than six days after completion of sealant installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.

E. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

END OF SECTION 066116

SECTION 071113 Bituminous Dampproofing

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cold-applied, cut-back asphalt dampproofing for exterior wall locations.

1.2 SUBMITTALS

A. 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).

1.3 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.

1.4 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by Karnak Chemical Corporation, or equivalent products by one of the following:

1. ChemRex, Inc.; Sonneborn Building Products Div.
2. Meadows: W.R. Meadows, Inc.

2.2 BITUMINIOUS DAMPPROOFING

A. General: Provide products recommended by manufacturer for designated application.

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. Semimastic Grade: Emulsified asphalt semimastic, prepared with mineral-colloid emulsifying agents and containing fibers other than asbestos, complying with ASTM D 1227, Type IV; Karnak 220AF, or equivalent.

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. Fill voids, seal joints, and apply bond breakers, if any, as recommended by prime materials manufacturer, with particular attention at construction joints.

C. 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.

D. Protection of Other Work: Do not allow liquid and mastic compounds to enter and clog drains and conductors. Prevent spillage and migration onto other surfaces of work by masking or otherwise protecting adjoining work.

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. Locations indicated on the Drawings.

3.3 COLD-APPLIED, ASPHALT EMULSION DAMPPROOFING

A. Semimastic Grade: Brush apply two coats of asphalt emulsion dampproofing, each at a rate of 2 to 3 gal./100 sq. ft. (1 L/sq. m), to produce a uniform, total dry-film thickness of not less than 30 mils (0.8 mm). Allow to dry between coats.

END OF SECTION 071113

SECTION 072100 - Thermal Insulation

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Fiberglass batt insulation.
2. Poly Scrim Insulation.
3. Rigid plastic insulation.

B. Related Sections include the following:

1. Division 9 Section "Gypsum Board Assemblies" for insulation installed in metal-framed assemblies.
2. Division 13 Section "Special Construction" for insulation installed in metal-framed buildings.

1.2 SUBMITTALS

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

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.

C. Research/Evaluation Reports: For foam-plastic insulation.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

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

1.4 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Extruded-Polystyrene Board Insulation:
 - a. Dow Chemical Company.
 - b. Owens Corning.
 - c. Tenneco Building Products.
2. Glass-Fiber Insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville Corporation.
 - c. Knauf Fiber Glass.
 - d. Owens Corning.

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.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:

1. Type IV, 1.60 lb/cu. ft. (26 kg/cu. m).
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.
3. Thermal Resistivity (R-value): 5.0 deg F x h x sq. ft./Btu, at 75 deg F (.88 K x m/W at 24 deg C), per 1-inch (25-mm).
4. Thickness: As indicated on drawings.
5. Application: Provide for below grade at exterior foundation walls and as a component of exterior wall assemblies where rigid insulation is indicated.

C. Kraft-Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type II (blankets with membrane facing); consisting of fibers manufactured from glass; batts covered with asphalt-coated kraft paper facing one side; passing ASTM E 136 for combustion characteristics.

1. Thermal Resistivity (R-value)
 - a. 3-1/2-inch - R-11 deg F x h x sq. ft./Btu, at 75 deg F; (90-mm - 1.93 K x m/W at 24 deg C).
 - b. 6-inch - R-19 deg F x h x sq. ft./Btu, at 75 deg F; (150-mm - 3.34 K x m/W at 24 deg C).
2. Thickness: As indicated on drawings.
3. Application: Provide for exterior wood-framed walls.

D. Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from glass; with maximum

flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

1. Thermal Resistivity (R-value)
 - a. 3-1/2-inch - R-11 deg F x h x sq. ft./Btu, at 75 deg F; (90-mm - 1.93 K x m/W at 24 deg C).
 - b. 6-inch - R-19 deg F x h x sq. ft./Btu, at 75 deg F; (150-mm - 3.34 K x m/W at 24 deg C).
2. Thickness: As indicated on drawings.
3. Application: Provide for concealed building insulation in attics/eaves, ceilings and elsewhere indicated on drawings.

2.3 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after 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 of interfering 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, and unsoiled and that has not been left 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. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

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 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. Install below grade perimeter insulation on vertical surfaces by setting units in adhesive.

1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.
2. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board set in adhesive.

C. 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.

D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill the cavities formed by framing members. If 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. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:

1. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.

F. Stuff glass-fiber, loose-fill insulation into miscellaneous voids and cavity spaces where shown and to fill voids in the building envelope. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

3.5 PROTECTION

A. 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 072100

072500 Membrane Air Barriers – Vapor Permeable

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. Weather Barrier Membrane (DuPont™ Tyvek® HomeWrap®)
2. Seam Tape (DuPont™ Tyvek® Tape)
3. Self-Adhered Flashing (DuPont™ FlexWrap™ NF, DuPont™ FlexWrap™ EZ, DuPont™ StraightFlash™, DuPont™ StraightFlash™ VF, and/or DuPont™ Flashing Tape)
4. Weather Barrier Accessories - Fasteners (DuPont™ Tyvek® Wrap Caps)

- B. Related Requirements:

1.3 Re Installation of Vinyl Siding matching existing. REFERENCES

- A. ASTM International

1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
2. ASTM C1193; Standard Guide for Use of Joint Sealants
3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E96; Test Method for Water Vapor Transmission of Materials
7. ASTM E1677; Specification for Air Barrier Material or System for Low-Rise Framed Building Walls
8. ASTM E2178; Test Method for Air Permeance of Building Materials

- B. AATCC – American Association of Textile Chemists and Colorists

1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

- C. TAPPI

1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.4 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer current technical literature for each component.

1. For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.
2. Product Data: Including the following information:

- a. Provide Health Product Declarations (HPDs) or list of weather barrier ingredients by name and Chemical Abstract Service (CAS) registry number or Proprietary Ingredients hazards associated with LT-1/LT-P1 down to 0.1 percent (1000 ppm).
- b. Provide Environmental Product Declarations (EPDs)
- c. Provide SDS (formerly MSDS), Article Information Sheet, third-party certifications, or product technical data confirming that systems meet or exceed emissions guidelines for volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), as follows:
 - 1) Commercial weather barrier complies with California Department of Public Health (CDPH) Standard.
 - 2) Adhesives and sealants wet-applied onsite are to meet/exceed VOC content requirements for wet-applied products and comply with SCAQMD Rule 1168.
 - 3) Flashing systems comply with SCAQMD Rule 1168 on VOC limits.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Report: For [**weather barrier**], from ICC-ES.
- B. AAMA Verified Component Listing status for [**flexible flashings**].
- C. Manufacturer's Instructions: For installation of each product specified.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer's product in accordance with manufacturer's installation guidelines and recommendations.
- B. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store weather barrier materials as recommended by system manufacturer. Do not store near heat source or open flame.

1.8 SCHEDULING

- A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.

1.9 WARRANTY

- A. Manufacturer's Product Warranty: To repair or replace weather barrier product that fails in materials within specified warranty period when all terms of Warranty are met.
 - 1. Warranty Period: 10 years from date of purchase.
- B. Manufacturer's Product and Labor Warranty: Manufacturer agrees to repair or replace weather barrier that fails in materials within specified warranty period, including removal and replacement of affected construction up to manufacturer's limits when all terms of Warranty are met.
 - 1. Warranty Period: 10 years from date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. DuPont Performance Building Solutions; 200 Powder Mill Road, DuPont Experimental Station 356
Wilmington, Delaware 19803; 1-800-448-9835; building.dupont.com

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures, without failure due to defective manufacture of products.

2.3 WEATHER BARRIER

- A. Basis of Design: spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® HomeWrap® and related assembly components.
- B. Performance Characteristics:
 - 1. Air Penetration Resistance: <0.004 cfm/ft² at 1.57 psf, when tested in accordance with ASTM E2178.
 - 2. Type I Air Barrier Material when tested in accordance with ASTM E1677.
 - 3. Type II Water Resistive Barrier when tested in accordance with ASTM E2556
 - 4. Water Vapor Transmission: 56 perms, when tested in accordance with ASTM E96-05, Method A.
 - 5. Water Penetration Resistance: 250 cm when tested in accordance with AATCC Test Method 127.
 - 6. Basis Weight: 1.8 oz/yd², when tested in accordance with TAPPI Test Method T-410.
 - 7. Air Resistance: 1200 seconds, when tested in accordance with TAPPI Test Method T-460.
 - 8. Breaking Strength: 30/30 lbs/in., when tested in accordance with ASTM D882.

9. Tear Resistance: 8/6 lbs, when tested in accordance with ASTM D1117.
10. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 15, Smoke Developed: 15.

2.4 WEATHER BARRIER FLASHING

- A. Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: DuPont de Nemours, Inc.; **DuPont™ FlexWrap™ NF** or comparable product by one of the following:
 2. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
 3. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E 331.
 4. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (minus 4 deg C) as Class A (without primer use).
 5. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- B. Conformable Weather Barrier Flashing for Sealing Penetrations: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: DuPont de Nemours, Inc.; **DuPont™ FlexWrap™ EZ** or comparable product by one of the following:
 2. Conformability: Able to create a continuous watertight seal around penetrations from weather barrier to penetration without cuts, patches, or fasteners.
 3. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E 331.
 4. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (minus 4 deg C) as Class A (without primer use).
 5. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- C. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: DuPont de Nemours, Inc.; **DuPont™ StraightFlash™** or comparable product by one of the following:
 2. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E 331.
 3. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (minus 4 deg C) as Class A without primer use.

4. Adhesion After Water Immersion: Exceeds minimum value of **1.5 lb./in. (0.26N/mm)**, after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- D. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, **dual-sided**, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, **176 deg F (80 deg C)** for 7 days.
1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: DuPont de Nemours, Inc.; **DuPont™ StraightFlash™ VF** or comparable product by one of the following:
 2. Water Penetration: No leakage at **6.24 psf (300 Pa)** per ASTM E 331.
 3. Low Temperature Adhesion: Exceeds minimum value of **1.5 lb./in. (0.26N/mm)** at **25 deg F (minus 4 deg C)** as Class A without primer use.
 4. Adhesion After Water Immersion: Exceeds minimum value of **1.5 lb./in. (0.26N/mm)**, after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- E. Strip Flashing: Composite flashing material composed of **polypropylene** laminate with 100 percent butyl-based, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, **176 deg F (80 deg C)** for 7 days.
1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: DuPont de Nemours, Inc.; **DuPont™ Flashing Tape** or comparable product by one of the following:
 2. Water Penetration: No leakage at **6.24 psf (300 Pa)** per ASTM E 331.
 3. Low Temperature Adhesion: Exceeds minimum value of **1.5 lb./in. (0.26N/mm)** at **25 deg F (minus 4 deg C)** as Class A without primer use.

2.5 WEATHER BARRIER ACCESSORIES

- A. Building Wrap Seam Tape: **[2] [or] [3]** inch wide, Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in building wrap.
1. Basis-of-Design Product: DuPont Safety & Construction: DuPont de Nemours, Inc.; **DuPont™ Tyvek® Tape**.
- B. Fasteners with Self-Gasketing Washers: Building wrap manufacturer's recommended pneumatically or hand-applied fasteners with **[1-inch- (25-mm-)]** diameter, high-density polyethylene cap washers with UV inhibitors.
1. Basis-of-Design Product: DuPont Safety & Construction: DuPont de Nemours, Inc.; **DuPont™ Tyvek® Wrap Caps**.
- C. Sealants
1. Provide sealants that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions.
 2. Products:
 - a. **DuPont™ Residential Sealant**

- b. Sealants recommended by the weather barrier manufacturer
- D. Insulating Foam Sealant: one component, expanding, low pressure-build, flexible polyurethane foam.
- 1. Basis-of-Design Product: DuPont Safety & Construction: DuPont de Nemours, Inc.; **DuPont™ Great Stuff Pro™ Window & Door Polyurethane Foam Sealant.**
- E. Primer for Flashings: Synthetic rubber-based product; spray applied. Strengthen adhesive bond at low temperature applications between weather products such as self-adhered flashing products, commercial building wraps, and common building sheathing materials.
- 1. Basis-of-Design Product: DuPont Safety & Construction: DuPont de Nemours, Inc., **DuPont™ Adhesive/Primer.**
 - 2. Peel Adhesion Test: Passes in accordance with ASTM D 3330, Test Method F, for the following.
 - a. Peel Angles: 0, 25, 72, and 180 degrees.
 - b. Substrates: Concrete masonry units (CMU), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
 - 3. Chemical Compatibility: Pass; AAMA 713.
 - 4. Flame Spread Index: 5; ASTM E 84.
 - 5. Smoke Development Index: 0; ASTM E 84.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements.
- B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.
 - 1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.
- C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.
 - 1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

3.3 WEATHER BARRIER INSTALLATION

- A. General: Comply with weather barrier manufacturer's written instructions and warranty requirements.
- B. Cover exposed exterior surface of sheathing with weather barrier securely fastened to structure per manufacturer's written instructions immediately after sheathing is installed.
 - 1. Maintain continuity of air and water barrier assemblies.
 - 2. Start weather barrier installation at a building corner, leaving 12 inches (300 mm) of weather barrier extended beyond corner to overlap.
 - 3. Install weather barrier horizontally starting at lower portion of wall surface. Extend bottom roll edge over sill plate 1" minimum. For air barrier installations, seal weather barrier along bottom edge with sealant or tape. Shingle weather barrier over back edge of through-wall flashings and seal weather barrier with building wrap tape. Ensure weeps are not blocked.
 - 4. Provide minimum 6 inches (150 mm) overlap at horizontal- and vertical-wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.
- C. Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.
 - 1. Shiplap horizontal seams in weather barrier to facilitate proper drainage.
- D. Fasteners: Use weather barrier manufacturer's recommended fasteners to secure weather barrier and install fasteners according weather barrier manufacturer's installation guidelines.
 - 1. Do not use temporary fasteners to permanently attach weather barrier.
 - 2. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
 - 3. Install fasteners with gasketing washers through flashing where recommended by manufacturer.
- E. Openings: Completely cover openings with weather barrier, and then cut weather barrier membrane at openings according to weather barrier manufacturer's installation guidelines.
 - 1. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
 - 2. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
 - 3. Install flashing according to weather barrier manufacturer's installation guidelines.

3.4 WEATHER BARRIER FLASHING

- A. Installation: Remove wrinkles and bubbles, reposition weather barrier as necessary to produce a uniform, smooth surface.
 - 1. Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.

2. Wipe surfaces to remove moisture, dirt, grease and other debris that could interfere with adhesion.
 3. Apply weather barrier manufacturer's recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.
 4. Lap weather barrier flashing a minimum of **2 inches (50 mm)** onto weather barrier.
 5. Apply pressure over entire surface using roller or firm hand pressure
- B. Rough Openings: Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions.
1. Apply [**6-inch- (150-mm-)**] wide conformable weather barrier flashing at door and window sills.
 2. Ensure that sill flashing does not slope to the interior.
 3. Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
 4. Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.
 5. Around door and window openings, apply butyl-based flashing to flaps of weather barrier per manufacturer's instructions.
 6. Seal building wrap head flap of the windows.
- C. Penetrations: Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product. Integrate products with flanges into the weather barrier.
- D. Terminations: Provide minimum **2 inches (50 mm)** overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane.
1. Secure weather barrier with fasteners and weather-barrier flashing.
- E. Flashing Patches: Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to train installers and observe subject test-wall areas and installations.
- B. Testing Agency: [**Owner will engage**] [**Engage**] a qualified third-party testing agency to perform tests and inspections.
- C. Field Quality Control Testing: Perform the following test on [**representative areas of structural-sealant-glazed curtain walls**] [**mockups**] <**Insert requirements**>.
1. Water Penetration: ASTM E 1105 as specified by Testing Agency. No water penetration shall occur as defined in ASTM E 1105.
 - a. Perform specified number of tests in each test area and at various stages of completion as directed by Architect.

- D. Prepare test and inspection reports.

3.6 CLEANING

- A. Immediately remove release paper and scrap from work area and dispose of material in accordance with requirements of **[Section 017300 "Execution."]** **[Section 017419 "Construction Waste Management and Disposal."]** **[Section 017300 "Execution" and Section 017419 "Construction Waste Management and Disposal."]**

3.7 PROTECTION

- A. Protect installed weather barrier from the following:
 - 1. Damage from cladding, structure, or a component of the structure (e.g., window, door, or wall system).
 - 2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
 - 3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
 - 4. UV exposure in excess of products' stated limits.

END OF SECTION 072500

SECTION 073100 ASPHALT SHINGLES

PART 1 - GENERAL

SCHEDULE 0 - SECTION INCLUDES

PRODUCT DATA SHEET 0 - Asphalt roofing shingles.

PRODUCT DATA SHEET 1 - Leak barrier and moisture shedding roof deck protection.

PRODUCT DATA SHEET 2 - Underlayment.

PRODUCT DATA SHEET 3 - Metal flashing associated with shingle roofing.

SCHEDULE 1 - RELATED SECTIONS

PRODUCT DATA SHEET 0 - Section 061000 - Rough Carpentry.

PRODUCT DATA SHEET 1 - Section 076200 - Sheet Metal Flashing and Trim.

SCHEDULE 2 - REFERENCES

PRODUCT DATA SHEET 0 - AC438-1011-R1 - New Acceptance Criteria for Alternative Asphalt Roofing Shingles

PRODUCT DATA SHEET 1 - American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

PRODUCT DATA SHEET 2 - Asphalt Roofing Manufacturers Association (ARMA).

PRODUCT DATA SHEET 3 - ASTM International (ASTM):

- 1.1 ASTM D 3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.
- 1.2 ASTM D 3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
- 1.3 ASTM D 3462 - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
- 1.4 ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 1.5 ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- 1.6 ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction.
- 1.7 ASTM C 1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
- 1.8 ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
- 1.9 ASTM E 903 - Standard Test Method for Solar Absorption, Reflectance and Transmission of Materials Using Integrating Spheres.

PRODUCT DATA SHEET 4 - California Title 24 Energy Efficient Standards.

PRODUCT DATA SHEET 5 - ENERGYSTAR.

PRODUCT DATA SHEET 6 - National Roofing Contractors Association (NRCA).

PRODUCT DATA SHEET 7 - Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

PRODUCT DATA SHEET 8 - U.S. Green Building Council (USGBC): Leadership in Energy and Environmental Design (LEED).

PRODUCT DATA SHEET 9 - Underwriters Laboratory (UL)

1.1 UL 790 - Tests for Fire Resistance of Roof Covering Materials.

1.2 UL 997 - Wind Resistance of Prepared Roof Covering Materials.

SCHEDULE 3 - DEFINITIONS

PRODUCT DATA SHEET 0 - Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual for definitions of roofing terms related to this section.

SCHEDULE 4 - SUBMITTALS

PRODUCT DATA SHEET 0 - Submit under provisions of Section 01 30 00 - Administrative Requirements.

PRODUCT DATA SHEET 1 - Product Data: Manufacturer's data sheets on each product to be used, showing compliance with requirements.

PRODUCT DATA SHEET 2 - Installation Instructions: Manufacturer's installation instructions, showing required preparation and installation procedures.

SCHEDULE 5 - QUALITY ASSURANCE

PRODUCT DATA SHEET 0 - Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.

PRODUCT DATA SHEET 1 - Installer Qualifications: Installer must be approved by manufacturer for installation of all roofing products to be installed under this section.

SCHEDULE 6 - REGULATORY REQUIREMENTS

PRODUCT DATA SHEET 0 - Provide a roofing system achieving an Underwriters Laboratories (UL) Class A fire classification.

PRODUCT DATA SHEET 1 - Install all roofing products in accordance with all federal, state and local building codes.

PRODUCT DATA SHEET 2 - All work shall be performed in a manner consistent with current OSHA guidelines.

SCHEDULE 7 - PRE-INSTALLATION MEETINGS

PRODUCT DATA SHEET 0 - Convene a pre-installation meeting a minimum two weeks prior to starting work of this section.

1.1 Contractor shall schedule and arrange meeting and meeting place and notify attendees.

1.2 Mandatory Attendees: Roofing installer and manufacturer's steep slope technical representative (not sales agent).

1.3 Optional Attendees: Owner's representative, Architect's representative, prime Contractor's representative.

1.4 Review all pertinent requirements for achieving the warranty specified below and set schedule for final warranty inspection.

SCHEDULE 8 - DELIVERY, STORAGE, AND HANDLING

PRODUCT DATA SHEET 0 - Store products in manufacturer's unopened labeled packaging until ready for installation.

PRODUCT DATA SHEET 1 - Store products in a covered, ventilated area, at temperature not more than 110 degrees F (43 degrees C); do not store near steam pipes, radiators, or in sunlight.

PRODUCT DATA SHEET 2 - Store bundles on flat surface to maximum height recommended by manufacturer; store rolls on end.

PRODUCT DATA SHEET 3 - Store and dispose of solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

SCHEDULE 9 - WEATHER CONDITIONS

PRODUCT DATA SHEET 0 - Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with roofing shingle manufacturer's recommendations.

SCHEDULE 10 - WARRANTY

PRODUCT DATA SHEET 0 - Provide manufacturer's standard limited warranty:

- 1.1 Provide to the Owner a GAF Shingle & Accessory Ltd. Warranty.

PART 2 - PRODUCTS**SCHEDULE 0 - MANUFACTURERS**

PRODUCT DATA SHEET 0 - Acceptable Manufacturer: GAF, Residential Roofing Products, which is located at: 1 Campus Drive Parsippany, NJ 07054; Toll Free Tel: 800 ROOF-411; Tel: 800-766-3411; Fax: 973-628-3451; Email: TechnicalQuestionsGAF@gaf.com; Web: www.gaf.com.

PRODUCT DATA SHEET 1 - Substitutions: Not permitted.

PRODUCT DATA SHEET 2 - Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

SCHEDULE 1 - SHINGLES

PRODUCT DATA SHEET 0 - See Drawings: GAF Timberline HDZ

PRODUCT DATA SHEET 1 - Timberline HDZ Lifetime High Definition Shingles, by GAF:

- 2.1 Self sealing, granule surfaced, asphalt shingle with a strong fiberglass reinforced Micro Weave core and StainGuard protection, which prevents pronounced discoloration from blue-green algae through formulation/unique blends of granules.
- 2.2 Architectural laminate styling provides a wood shake appearance with a 5 5/8in. exposure. Features GAF's patented High Definition color blends and enhanced shadow effect.
- 2.3 UL 790 Class A rated with UL 997 Wind Resistance Label; ASTM D 7158, Class H; ASTM D 3161, Type 1; ASTM D 3018, Type 1; ASTM D 3462; AC438 compliant; CSA 123.5-98; Dade County Approved, Florida Building Code Approved, Texas Dept of Insurance Approved, ICC Report Approval.

PRODUCT DATA SHEET 2 - ** NOTE TO SPECIFIER ** Delete all but one of

the following styles of hip and ridge shingles.

SCHEDULE 2 - HIP AND RIDGE SHINGLES

PRODUCT DATA SHEET 0 - High profile self-sealing hip and ridge cap shingle matching the color of selected roof shingle. Each bundle covers approx. 20 lineal feet (6.10m). Timbertex Premium Ridge Cap Shingles, by GAF.

PRODUCT DATA SHEET 1 - Distinctive self-sealing hip and ridge cap shingle complementing the color of selected roof shingle. Each bundle covers approx. 31 lineal feet (9.45m) with an 8 inch (203mm) exposure. Ridglass 10in. Ridge Cap Shingles by GAF.

PRODUCT DATA SHEET 2 - Distinctive self-sealing hip and ridge cap shingle complementing the color of selected roof shingle. Each bundle covers approx. 31 lineal feet (9.45m) with an 8 inch (203mm) exposure Ridglass 8in. Ridge Cap Shingles by GAF.

PRODUCT DATA SHEET 3 - Distinctive self-sealing hip and ridge cap shingle complementing the color of selected roof shingle. Each bundle covers approx. 25 lineal feet (7.62mm) with a 6 2/3 inch (169mm) exposure. Seal-A-Ridge Ridge Cap Shingles by GAF.

PRODUCT DATA SHEET 4 - Distinctive hip and ridge cap shingle complementing the color of selected roof shingle. Each bundle covers approx. 33.3 lineal feet (10.15m) with a 5 5/8 inch (147mm) exposure. Z Ridge Shingles by GAF.

PRODUCT DATA SHEET 5 - Distinctive impact resistant self-sealing hip and ridge cap shingle complementing the color of selected roof shingle. Each bundle covers approx. 25 lineal feet (7.62m) with a 6 2/3 inch (169mm) exposure. Seal-A-Ridge ArmorShield Ridge Cap Shingles by GAF.

PRODUCT DATA SHEET 6 - Ridge cap shingle field fabricated from the same color and type of field shingle. Each bundle covers approx. 33 lineal feet (10.15m).

SCHEDULE 3 - STARTER STRIPS

PRODUCT DATA SHEET 0 - Self sealing starter shingle designed for all roof shingles. Each bundle covers approx. 120 lineal feet (36.58m). ProStart Starter Strip by GAF.

SCHEDULE 4 - LEAK BARRIER

PRODUCT DATA SHEET 0 - Self-adhering, self-sealing, bituminous leak barrier surfaced with fine, skid-resistant granules. Approved by UL, Dade County, ICC, State of Florida and Texas Department of Insurance. Each roll contains approx. 150 sq ft (13.9 sq.m.), 36 inches X 50 feet (0.9m x 20.3m) or 200 sq ft (18.6 sq.m.), 36 inches X 66.7 feet (0.9m x 20.3m). Weather-Watch Leak Barrier, by GAF.

PRODUCT DATA SHEET 1 - Self-adhering, self-sealing, bituminous leak barrier surfaced with a smooth polyethylene film. Approved by UL, Dade County, ICC, State of Florida and Texas Department of Insurance. Each Roll contains approx. 200 sq ft. (18.6 sq.m.), 36 inches x 66.7 feet (0.9m x 20.3m). StormGuard Leak Barrier, by GAF.

SCHEDULE 5 - UNDERLAYMENT

PRODUCT DATA SHEET 0 - Premium, water repellant, breather type non-asphaltic underlayment. UV stabilized polypropylene construction. Meets or exceeds ASTM D226 and D4869. Approved by Dade County, Florida Building Code, and ICC. Roll available in 10 squares (approximately 1003 sq. ft.) of material at 54in. x 223ft. and 4 square (approximately 400.2 sq.ft.) of material at 36in. x 133.4ft. Deck-Armor Premium Breathable Roof Deck Protection,

by GAF.

PRODUCT DATA SHEET 1 - #15 Roofing Underlayment: Water repellent breather type cellulose fiber building paper. Meets or exceeds the requirements of ASTM D 4869 Type I.

SCHEDULE 6 - ROOFING CEMENT

PRODUCT DATA SHEET 0 - Asphalt Plastic Roofing Cement meeting the requirements of ASTM D 4586, Type I or II.

SCHEDULE 7 - ROOF ACCESSORIES

PRODUCT DATA SHEET 0 - Paint: Exterior acrylic rust resistant aerosol roof accessory paint. Each 6 oz can is available in boxes of 6 and in color to compliment the roof. Shingle-Match Roof Accessory Paint by GAF.

PRODUCT DATA SHEET 1 - Compression Collars: UV stable solid molded PVC compression collar, Kynar PVDF coated 24 gauge galvanized flange, Ultimate Pipe Flashing by Lifetime Tool.

SCHEDULE 8 - ATTIC VENTILATION

PRODUCT DATA SHEET 0 - Ridge Vents:

- 2.1 Flexible rigid plastic ridge ventilator designed to allow the passage of hot air from attics, while resisting snow infiltration. For use in conjunction with eave/soffit ventilation products. Provides 12.5 sq inches NFVA per lineal foot (26460 sq.mm/m). Each package contains 20 lineal feet (6.10m) of vent. Cobra Ridge Runner Ridge Vent by GAF.
- 2.2 to evacuate hot air from attics. Each vent provides 50 sq in NFVA. MasterFlow NSB50A Passive Roof Louver, by GAF.
- 2.3 Rooftop mounted, square-top metal utility ventilator designed to evacuate hot air from attics, bathrooms, and kitchen ducts. Each vent provides 50 sq in NFVA. MasterFlow RV50A Metal Utility Vent, by GAF.

SCHEDULE 9 - NAILS

PRODUCT DATA SHEET 0 - Nails: Standard round wire, zinc-coated steel or aluminum; 10 to 12 gauge, smooth, barbed or deformed shank, with heads 3/8 inch (9mm) to 7/16 inch (11mm) in diameter. Length must be sufficient to penetrate into solid wood at least 3/4 inch (19mm) or through plywood or oriented strand board by at least 1/8 inch (3.18mm).

SCHEDULE 10 - METAL FLASHING

PRODUCT DATA SHEET 0 - Galvanized Steel: 24 gauge hot-dip galvanized steel sheet, complying with ASTM A 653/A 653M, G90/Z275.

PRODUCT DATA SHEET 1 - Copper: 16-oz/sq ft (0.56mm) copper sheet, complying with ASTM B 370.

PRODUCT DATA SHEET 2 - Aluminum: 0.032-inch (0.8mm) aluminum sheet, complying with ASTM B 209.

PART 3 - EXECUTION

SCHEDULE 0 - EXAMINATION

PRODUCT DATA SHEET 0 - Do not begin installation until roof deck has been properly prepared.

PRODUCT DATA SHEET 1 - If roof deck preparation is the responsibility of another installer, notify

Architect or building owner of unsatisfactory preparation before proceeding.

SCHEDULE 1 - REMOVAL OF EXISTING ROOFING

PRODUCT DATA SHEET 0 - Remove all existing roofing down to the roof deck in areas noted only.

PRODUCT DATA SHEET 1 - Verify that deck is dry, sound, clean and smooth, free of depressions, waves and projections.

PRODUCT DATA SHEET 2 - Cover with sheet metal all holes over 1 inch (25 mm) diameter, cracks over 1/2 inch (12 mm) in width, loose knots and excessively resinous areas.

PRODUCT DATA SHEET 3 - Replace damaged deck with new materials.

PRODUCT DATA SHEET 4 - Clean deck surfaces thoroughly prior to installation of eaves protection membrane and underlayment.

SCHEDULE 2 - PREPARATION OF SUBSTRATE

PRODUCT DATA SHEET 0 - Clean deck surfaces thoroughly prior to installation of leak barrier and roof deck protection.

PRODUCT DATA SHEET 1 - At areas to receive leak barrier, fill knot holes and cracks with latex filler.

PRODUCT DATA SHEET 2 - Chimneys: Install crickets on the upslope side of any chimney located in the north, on a roof steeper than 6:12, or wider than 24 inches (610 mm).

SCHEDULE 3 - INSTALLATION OF UNDERLAYMENT

PRODUCT DATA SHEET 0 - Install using methods recommended by manufacturer in accordance with local building code. When local codes and application instructions are in conflict, the more stringent requirements shall take precedence.

PRODUCT DATA SHEET 1 - Eaves:

- 3.1 Place eave edge metal flashing tight with fascia boards; lap joints 2 inches (50 mm) and seal with plastic cement; nail at top of flange.
- 3.2 On roofs with slope between 2:12 and 4:12, and on all roofs in the north, install leak barrier up the slope from eave edge to 36 inches from the edge or at least 24 inches (610 mm) beyond the interior face of the warm exterior wall, whichever is greater; lap ends 6 inches (150 mm) and bond.

PRODUCT DATA SHEET 2 - Valleys:

- 3.1 Install leak barrier at least 36 inches wide centered on valley; lap ends 6 inches (150 mm) and seal.
- 3.2 Where valleys are indicated to be "open valleys", install metal flashing over leak barrier before roof deck protection is installed; DO NOT NAIL THROUGH metal flashing; secure by nailing at 18 inches (457 mm) on center just beyond edge of flashing so that nail heads hold down edge.

PRODUCT DATA SHEET 3 - Hips and Ridges:

- 3.1 Install GAF leak barrier along entire lengths. If ridge vents are to be installed, position the GAF leak barrier so that the ridge slots will not be covered.

PRODUCT DATA SHEET 4 - Roof Deck:

- 3.1 Install one layer of roof deck protection over entire area not protected by eave or valley membrane; run sheets horizontally lapped so water sheds; nail in place.

- 3.2 On roofs sloped at more than 4 in 12, lap horizontal edges at least 2 inches (50 mm) and at least 2 inches (50 mm) over eave protection membrane.
- 3.3 On roofs sloped between 2 in 12 and 4 in 12, lap horizontal edges at least 19 inches (480 mm) and at least 19 inches (485 mm) over eave protection membrane.
- 3.4 Lap ends at least 4 inches (100 mm); stagger end laps of each layer at least 36 inches (915 mm).
- 3.5 Lap roof deck protection over valley protection at least 6 inches (152 mm).

PRODUCT DATA SHEET 5 - Deck-Armor Application

- 3.1 Deck-Armor shall be installed over a clean, dry deck.
- 3.2 Install Weather Watch or StormGuard Leak Barrier at eaves, valleys, rakes, skylights, dormers and other vulnerable leak areas.
- 3.3 Lay Deck-Armor over deck and overlap 3in. (76mm) at side laps and 6in. (152mm) at end laps.
- 3.4 For exposure to rain or snow, overlap 12in. (305mm) at end laps.
- 3.5 For side and end laps: fasten Deck-Armor 12in. (305mm) o.c. (6in. (152mm) o.c. for high wind areas).
- 3.6 For middle of the roll: fasten Deck-Armor 24in. (610mm) o.c. (12in. (305mm) o.c. for high wind areas).
- 3.7 For exposure to rain or snow, completely cover all side laps, end laps and fasteners with tape.
- 3.8 For long term exposure see complete Deck-Armor installation instructions for side lap detail.
- 3.9 If roof may be exposed to high winds, apply tape over all fasteners at the center of the roll to prevent rain or snow from entering at the fasteners.

PRODUCT DATA SHEET 6 - Penetrations:

- 3.1 At vent pipes, install a 24 inch (610 mm) square piece of leak barrier lapping over roof deck protection; seal tightly to pipe.
- 3.2 At vertical walls, install leak barrier extending at least 6 inches (150 mm) up the wall and 12 inches (305 mm) on to the roof surface lapping over roof deck protection.
- 3.3 At skylights and roof hatches, install leak barrier up the sides of the frame and 12 inches (305 mm) on to the roof surface on all sides, lapping over roof deck protection.
- 3.4 At chimneys, install leak barrier around entire chimney extending at least 6 inches (152 mm) up the wall and 12 inches (305 mm) on to the roof surface lapping over roof deck protection.
- 3.5 At rake edges, install metal edge flashing over leak barrier and roof deck protection; set tight to rake boards; lap joints at least 2 inches (50 mm) and seal with plastic cement; secure with nails.
- 3.6 At hips and ridges, install leak barrier along entire lengths. If ridge vents are to be installed, position the leak barrier so that the ridge slots are not covered.

SCHEDULE 4 - INSTALLATION OF SHINGLES

PRODUCT DATA SHEET 0 - Install in accordance with manufacturer's instructions and requirements of local building code.

- 3.1 Avoid breakage of shingles by avoiding dropping bundles on edge, by separating shingles carefully (not by "breaking" over ridge or bundles), and by taking extra precautions in temperatures below 40 degrees F (4 degrees C).
- 3.2 Handle carefully in hot weather to avoid damaging shingle edges.
- 3.3 Secure with 4 to 6 nails per shingle; use number of nails required by manufacturer or by code, whichever is greater. Nails must be long enough to penetrate through plywood or OSB, or 3/4 inch (19 mm) into dimensional lumber.

PRODUCT DATA SHEET 1 - Install hip and ridge shingles as required by the manufacturer. At ridges, install hip and ridge shingles over ridge or ridge vent material.

PRODUCT DATA SHEET 2 - Make valleys using "open valley" technique:

- 3.1 Snap diverging chalk lines on metal flashing, starting at 3 inches (75 mm) each side of top of valley, spreading at 1/8 inch per foot (9 mm per meter) to eave.
- 3.2 Run shingles to chalk line.
- 3.3 Trim last shingle in each course to match chalk line; do not trim shingles to less than 12 inches (305 mm) width.
- 3.4 Apply 2 inches (50 mm) wide strip of plastic cement under ends of shingles, sealing to metal flashing.

PRODUCT DATA SHEET 3 - Make valleys using "closed cut valley" technique:

- 3.1 Run the first, and only the first, course of shingles from the higher roof slope across the valley at least 12 inches (305 mm).
- 3.2 Run all courses of shingles from the lower roof slope across the valley at least 12 inches (305 mm) and nail not closer than 6 inches (150 mm) to center of valley.
- 3.3 Run shingles from the upper roof slope into valley and trim 2 inches (50 mm) from center of valley.

PRODUCT DATA SHEET 4 - Make valleys using "woven valley" technique.

- 3.1 Run shingles from both roof slopes at least 12 inches (305 mm) across center of valley, lapping alternate sides in a woven pattern.
- 3.2 Nail not closer than 6 inches (150 mm) to center of valley.

PRODUCT DATA SHEET 5 - All penetrations are to be flashed according to GAF, ARMA and NRCA application instructions and construction details.

PRODUCT DATA SHEET 6 - For skylights, consult the manufacturer of the skylight or roof hatch for specific installation recommendations. Skylights and roof hatches shall be installed with pre-fabricated metal flashings specifically designed for the application of the unit.

SCHEDULE 5 - INSTALLATION OF VENTILATION

PRODUCT DATA SHEET 0 - Code Requirements: Ventilation shall meet or exceed current FHA, HUD and local code requirements.

PRODUCT DATA SHEET 1 - Ridge Vents:

- 3.1 Cut continuous vent slot through sheathing, stopping 6 inches (150 mm) from each end of ridge.
- 3.2 On roofs without ridge board, make slot 2 inches (50 mm) wide, centered on ridge.
- 3.3 On roofs with ridge board, make two slots 1-3/4 inches (89 mm) wide, one on each side.
- 3.4 Install ridge vent material full length of ridge, including uncut areas.
- 3.5 Butt ends of lengths of ridge vent material and join using plastic cement.
- 3.6 Install eave vents in sufficient quantity to equal or exceed the ridge vent area, calculated as specified by manufacturer.
- 3.7 Install ridge shingles over ridge vent material; use nails of specified length; do not drive nails home, leaving 3/4 inch (19 mm) slot open between ridge and roof shingles.

SCHEDULE 6 - PROTECTION

PRODUCT DATA SHEET 0 - Stage work progress so that traffic is minimized over completed roofing.

PRODUCT DATA SHEET 1 - Protect installed products until completion of project

END OF SECTION 071113



Timberline® HDZ™

High Definition® Lifetime Shingles

INSTALLATION INSTRUCTIONS

INSTRUCCIONES DE INSTALACIÓN

GENERAL INSTRUCTIONS

COVERAGE: 3 bundles (1 bundle of 20 and 2 bundles of 22), when applied according to instructions, will cover 98.4 square feet (9.14 square meters).

ROOF SLOPE: GAF shingles must be installed on slopes of 2:12 or greater.

ROOF DECK: Use minimum 3/8" (10 mm) plywood or OSB decking as recommended by APA-The Engineered Wood Assn. Wood decks must be well-seasoned and supported, having a maximum 1/8" (3 mm) spacing using a minimum nominal 1" (25 mm) thick lumber and a maximum 6" (152 mm) width, having adequate nail-holding capacity and a smooth surface. Do NOT fasten shingles directly to insulation or insulated deck unless authorized in writing by GAF. Roof decks and existing surfacing material must be dry prior to installation of shingles.

UNDERLAYMENT: Underlayment is required by many code bodies and is required to maintain the shingles' UL Class A fire rating. When using FeltBuster® High-Traction Synthetic Roofing Felt as underlayment, it MUST be installed over one layer of VersaShield® Fire-Resistant Roof Deck Protection in order to maintain a Class A fire rating for GAF asphalt shingles.

FASTENERS: Use only zinc-coated steel or aluminum, 10 – 12 gauge, barbed, deformed, or smooth shank roofing nails with heads 3/8" (10 mm) to 7/16" (12 mm) in diameter. Fasteners should be long enough to penetrate at least 3/4" (19 mm) into wood decks or just through the plywood decks. Fasteners must be driven flush with the surface of the shingle. Overdriving will damage the shingle. Raised fasteners will interfere with the sealing of the shingles and can back out.

RELEASE FILM: Plastic film strips are present either on the back or face of each shingle. The film strips are to prevent shingles from sticking together while in the bundle. Do not remove the film strip before or during the installation.

ASPHALT PLASTIC CEMENT: Use asphalt plastic cement conforming to ASTM D4586 Type I or II.

WIND RESISTANCE/HAND SEALING: These shingles have a special thermal sealant that bonds the shingles together after installation when exposed to sun and warm temperatures. If shingles are damaged by winds before sealing or are not exposed to adequate surface temperatures, or if the self-sealant gets dirty, the shingles may never seal. Failure to seal under these circumstances results from the nature of self-sealing shingles, and is not a manufacturing defect. If shingles are to be applied during PROLONGED COLD periods or in areas where airborne dust or sand can be expected before sealing occurs, the shingles MUST be hand sealed. See Nailing Instructions/Hand Sealing.

VENTILATION: Proper underdeck ventilation is essential to reduce moisture build up and prevent mold. Ventilation must be designed to meet or exceed current F.H.A., H.U.D., or local code minimum requirements. For more information on ventilation requirements, see gaf.com.

INSTRUCCIONES GENERALES

COBERTURA: 3 paquetes (1 paquete de 20 y 2 paquetes de 22), cuando se aplica de acuerdo con las instrucciones, cubrirán 98.4 pies cuadrados (9.14 metros cuadrados).

PENDIENTE DE TECHO: Las tejas GAF deben instalarse en pendientes de 2:12 o más.

CUBIERTA DEL TECHO: Utilice una cubierta mínima de 3/8" (10 mm) de madera contrachapada u OSB como se recomienda en la Asociación norteamericana de madera estructural (APA, The Engineered Wood Association). Las cubiertas de madera deben estar bien estacionadas y sujetas, con un espacio máximo de 1/8" (3 mm) utilizando madera gruesa con un valor nominal mínimo de 1" (25 mm) y un máximo de 6" (152 mm). Las cubiertas deben tener tanto una capacidad adecuada para resistir los clavos como una superficie lisa. NO fije las tejas directamente sobre el aislante ni sobre una cubierta aislada, salvo que GAF lo autorice por escrito. Las cubiertas del techo y el material de revestimiento existente deben estar secos antes de la instalación de las tejas.

CAPA BASE: Muchos organismos reguladores exigen una capa base a fin de mantener las tejas con una clasificación contra incendio Clase A, según lo establecido por UL. Cuando se utilice el Filtro sintético de alta tracción para techos FeltBuster® como capa base, este DEBE instalarse sobre una capa de Protección para cubierta de techo ignífuga VersaShield® para mantener clasificación contra incendio Clase A de las Tejas asfálticas de GAF.

SUJETADORES: Utilice solamente clavos de acero recubiertos con zinc o aluminio, calibre 10 y 12, arponados, roscados o de vástago liso con cabezas de 3/8" (10 mm) a 7/16" (12 mm) de diámetro. Los sujetadores deben tener la longitud suficiente para penetrar al menos 3/4" (19 mm) las cubiertas de madera o solo atravesar las cubiertas de madera contrachapada. Los sujetadores deben quedar alineados con la superficie de la teja. La teja se dañará si la traspasa. Los sujetadores que sobresalen interfieren con el sellado de las tejas y pueden aflojarse.

PELÍCULA DE LIBERACIÓN: Cada teja tiene franjas de una película plástica en el frente o el reverso. Estas películas evitan que las tejas se peguen entre sí en el paquete. No retire la franja de la película antes ni durante la instalación.

CEMENTO PLÁSTICO ASFÁLTICO: Utilice cemento plástico asfáltico conforme a la norma ASTM D4586 para materiales Tipo I o II.

RESISTENCIA AL VIENTO/SELLADO A MANO: Estas tejas cuentan con un sellador térmico de especialidad que adhiere las tejas luego de su instalación al entrar en contacto con el sol y las temperaturas cálidas. Si el viento daña las tejas antes de que se sellen, si no están expuestas a temperaturas de superficie adecuadas, o bien si el autosellador se ensucia, es posible que las tejas nunca se adhieran. La falta de sellado bajo estas circunstancias es el resultado de la naturaleza de las tejas autoadhesivas, no se trata de un defecto de fabricación. Si se colocan las tejas durante períodos PROLONGADOS DE FRÍO o en regiones donde se espera que haya polvo o arena transportada por el aire, las tejas DEBEN sellarse de forma manual. Consulte Instrucciones para la colocación de clavos/sellado a mano.

VENTILACIÓN: Una ventilación adecuada debajo de la cubierta es fundamental para reducir la acumulación de humedad y prevenir la formación de moho. La ventilación debe diseñarse para cumplir o superar los requisitos mínimos actuales de la Administración Federal de Vivienda (FHA, Federal Housing Administration), del Departamento de Vivienda y Desarrollo Urbano (HUD, Department of Housing and Urban Development), o bien de los códigos locales. Para obtener más información sobre los requisitos de ventilación, visita es.gaf.com.

NAILING INSTRUCTIONS / HAND-SEALING

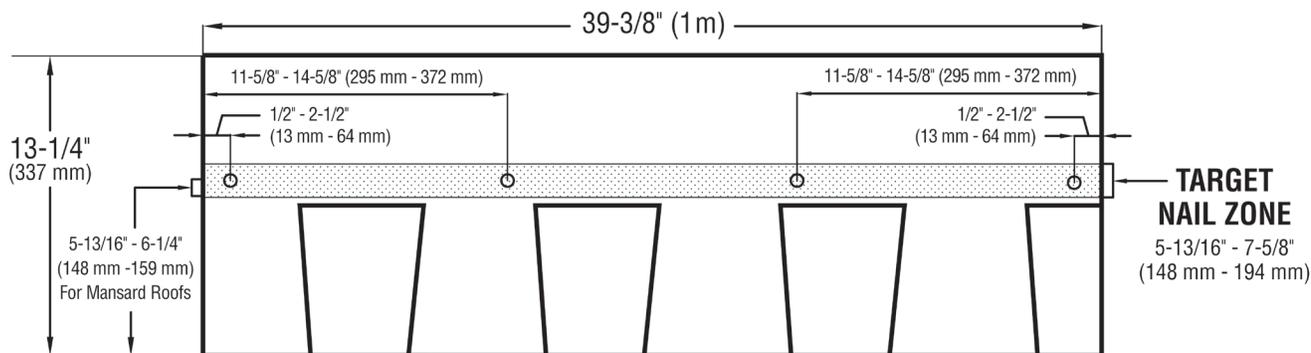
INSTRUCCIONES DE CLAVADURA / SELLADO A MANO

To hand-seal shingles and to ensure immediate sealing, apply 4 quarter-sized dabs of shingle tab adhesive on the back of the shingle 1" (25 mm) and 13" (330 mm) in from each side and 1" (25 mm) up from bottom of the shingle. Press shingle firmly into the adhesive.

CAUTION: Apply ONLY a thin uniform layer of asphalt plastic cement less than 1/8" (3 mm) thick. Excess amounts can cause blistering of the shingles and may soften the asphalt in underlayments and leak barriers, resulting in the asphalt dripping and staining.

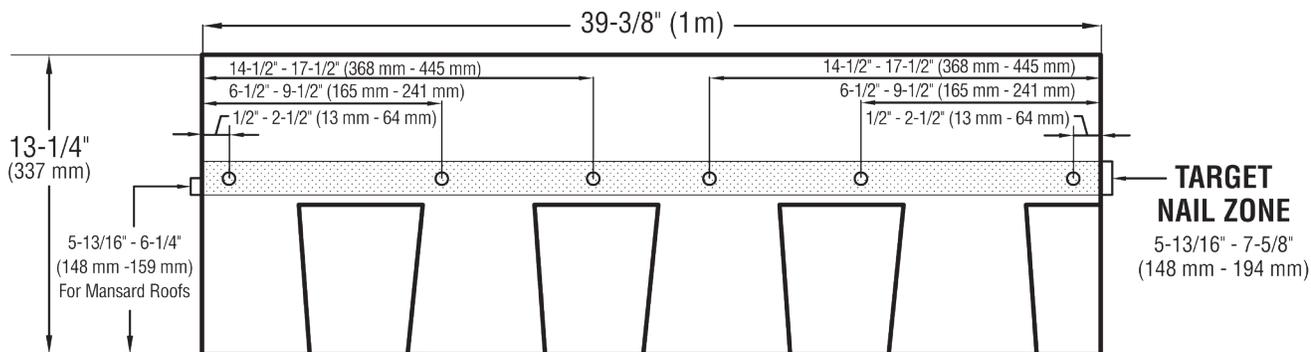
Para sellar las tejas a mano y garantizar una adhesión inmediata, coloque 4 pizcas del tamaño de una moneda de 25 centavos del adhesivo en la parte posterior de la teja a 1" (25 mm) y 13" (330 mm) hacia el interior de cada lado y a 1" (25 mm) hacia arriba desde la parte inferior de la teja. Presione la teja con firmeza contra el adhesivo.

PRECAUCIÓN: Aplique ÚNICAMENTE una capa delgada y uniforme del cemento plástico asfáltico con un espesor menor que 1/8" (3 mm). Cantidades excesivas pueden producir ampollamiento en las tejas, además de ablandar el asfalto en las capas base y las barreras contra goteras, lo cual provocará goteo y manchas en el asfalto.



STANDARD NAILING PATTERN: Nail shingles with 4 nails approximately 6 7/8" (174 mm) from bottom of shingle, in nailing area, as shown. Nails must not be exposed. For mansard roofs (21:12 and above), nail a nominal 6" (152 mm) from the bottom of the shingle and hand-seal shingles.

PATRÓN COMÚN PARA LA COLOCACIÓN DE CLAVOS: Clave las tejas con 4 clavos ubicados, aproximadamente, a 6 7/8" (174 mm) de distancia de la parte inferior de la teja en el área de clavado, tal como se muestra en la imagen. Los clavos no deben quedar expuestos. En el caso de techos de mansarda (con pendientes de 21:12 y superiores), coloque los clavos a una distancia nominal de 6" (152 mm) de la parte inferior de la teja y selle las tejas a mano.



ENHANCED NAILING PATTERN*: Nail shingles with 6 nails approximately 6 7/8" (174 mm) from bottom of shingle, in nailing area, as shown. Nails must not be exposed. For mansard roofs (21:12 and above), nail a nominal 6" (152 mm) from the bottom of the shingle and hand-seal shingles.

* Required by some local codes and required for enhanced wind coverage on certain products. See limited warranty for details.

PATRÓN MEJORADO DE COLOCACIÓN DE CLAVOS*: Clave las tejas con 6 clavos ubicados, aproximadamente, a 6 7/8" (174 mm) de distancia de la parte inferior de la teja en el área de clavado, tal como se muestra en la imagen. Los clavos no deben quedar expuestos. En el caso de techos de mansarda (con pendientes de 21:12 y superiores), coloque los clavos a una distancia nominal de 6" (152 mm) de la parte inferior de la teja y selle las tejas a mano.

* Requerido por algunos códigos locales y requerido para una mejor protección contra el viento en algunos productos. Para obtener información detallada, consulte la garantía limitada.

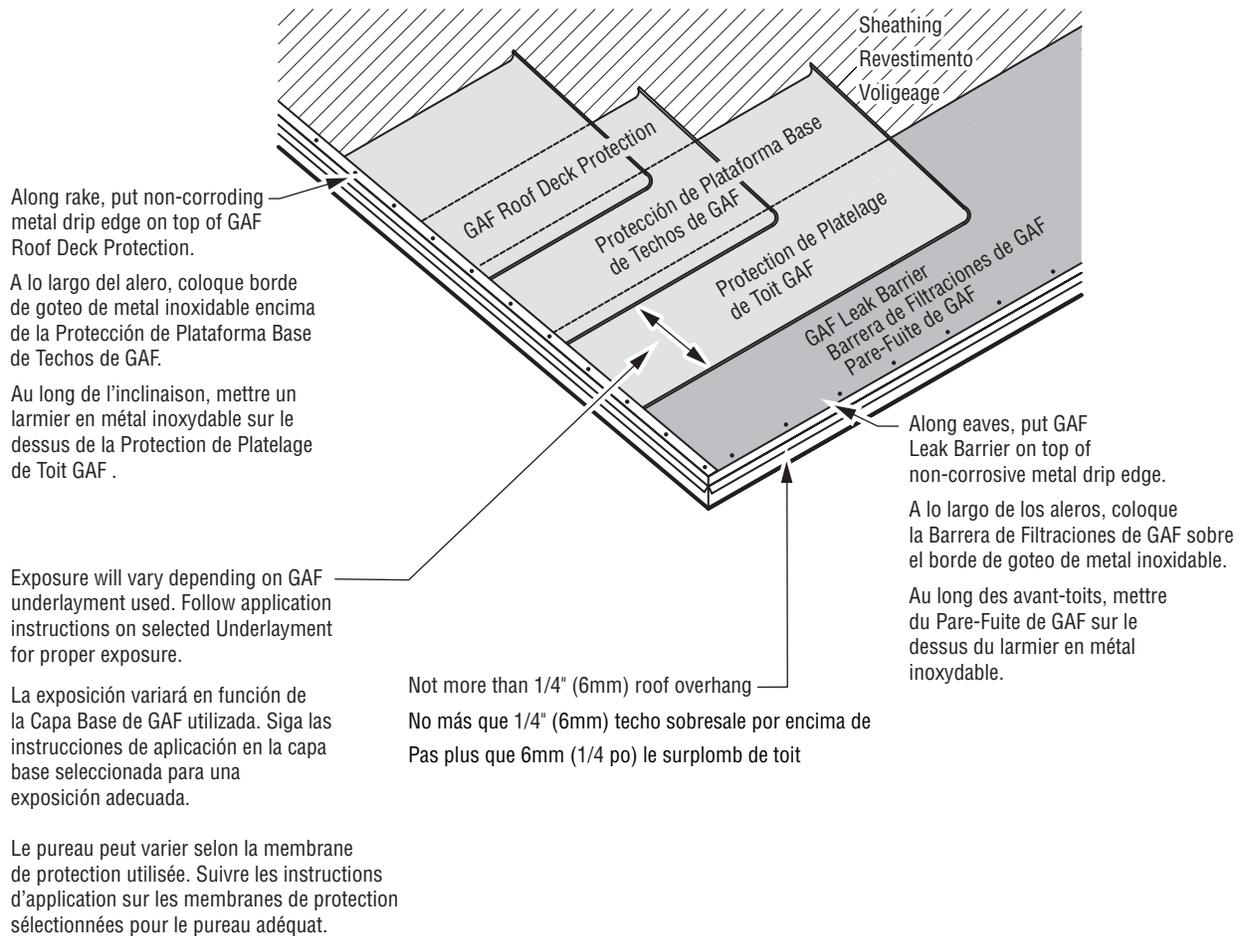
INSTALLING UNDERLAYMENT INSTALANDO LA CAPA BASE

UNDERLAYMENT: FOR ROOF SLOPES 2:12 TO LESS THAN 4:12

Application of eave flashing: At eaves and where ice dams can be expected, use one layer of GAF Leak Barrier. Eave flashing must not overhang the eave edge by more than 1/4" (6 mm) and should extend 24" (610 mm) beyond the inside wall line. Where ice dams or debris dams are not expected, install 2 plies of GAF Roof Deck Protection. Application of underlayment: Completely cover the deck with two layers of GAF Roof Deck Protection as shown. Use only enough nails to hold underlayment in place until covered by shingles.

CAPA BASE: PARA TECHOS CON PENDIENTES DE 2:12 A MENOS DE 4:12

Aplicación de vierteaguas para aleros: En los aleros y donde se pueda esperar la presencia de estancamientos de hielo, use una capa de barrera contra goteras de GAF. El vierteaguas para aleros no debe sobresalir el borde del techo más de 1/4" (6 mm) y extenderse 24" (610 mm) más allá de la línea interior de la pared. Donde no se esperen estancamientos de hielo o escombros, instale 2 pliegues de protección de la cubierta del techo de GAF. Aplicación de capa base: Cubra completamente la plataforma base con dos capas de protección de la cubierta del techo de GAF como se muestra. Use solamente la cantidad suficiente de clavos como para sostener la capa base en su lugar hasta que la haya cubierto con las tejas.



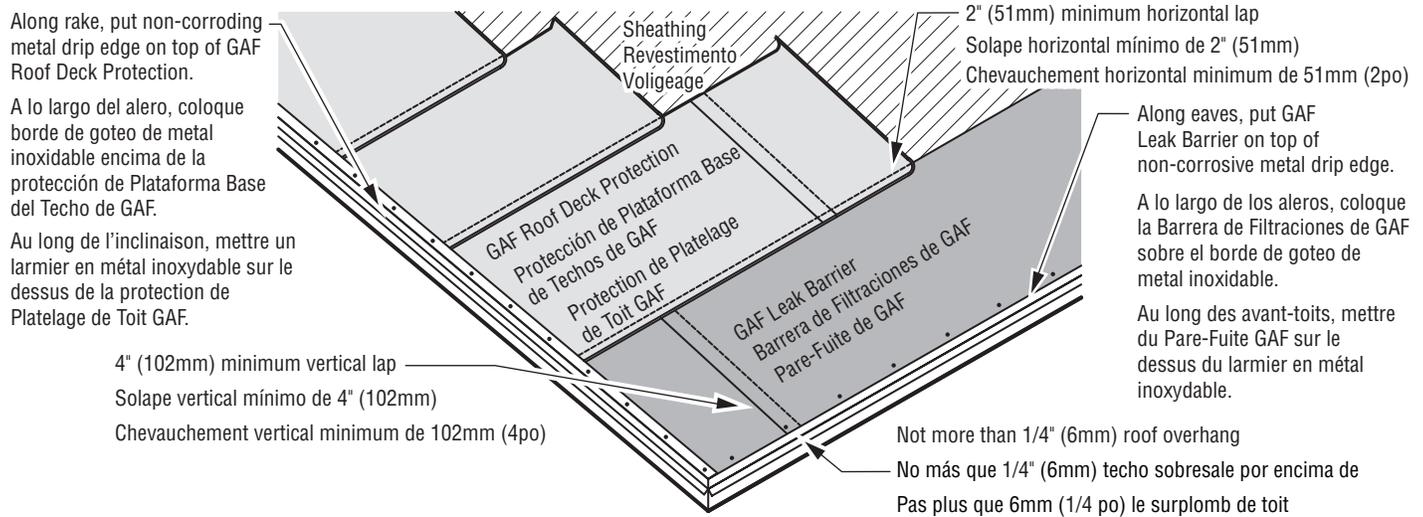
UNDERLAYMENT: FOR ROOF SLOPES 4:12 OR MORE

Application of eave flashing: At eaves and where ice dams can be expected, use one layer of GAF Leak Barrier. Eave flashing must extend 24" (610 mm) beyond the inside wall line. Application of underlayment: Cover deck with one layer of GAF Roof Deck Protection installed without wrinkles. Use only enough nails to hold underlayment in place until covered by shingles.

CAPA BASE: PARA TECHOS CON PENDIENTES DE 4:12 O MÁS

Aplicación de vierteaguas para aleros: En los aleros y donde se pueda esperar la presencia de estancamientos de hielo, use una capa de barrera contra goteras de GAF. El vierteaguas para aleros extenderse 24" (610 mm) más allá de la línea interior de la pared.

Aplicación de capa base: Cubra la cubierta con una capa de protección de la cubierta del techo de GAF instalada sin arrugas. Use solamente la cantidad suficiente de clavos como para sostener la capa base en su lugar hasta que la haya cubierto con las tejas.



INSTALLING STARTER STRIP SHINGLES INSTALACIÓN DE TEJAS DE HILADA INICIAL

STARTER COURSE

Use GAF starter strip shingles along the eaves and rake. Apply as shown. NOTE: GAF starter strip shingles are recommended at the rakes for best performance and required for enhanced warranty coverage on certain products (see limited warranties for details). Refer to application instructions for the selected starter strip shingles.

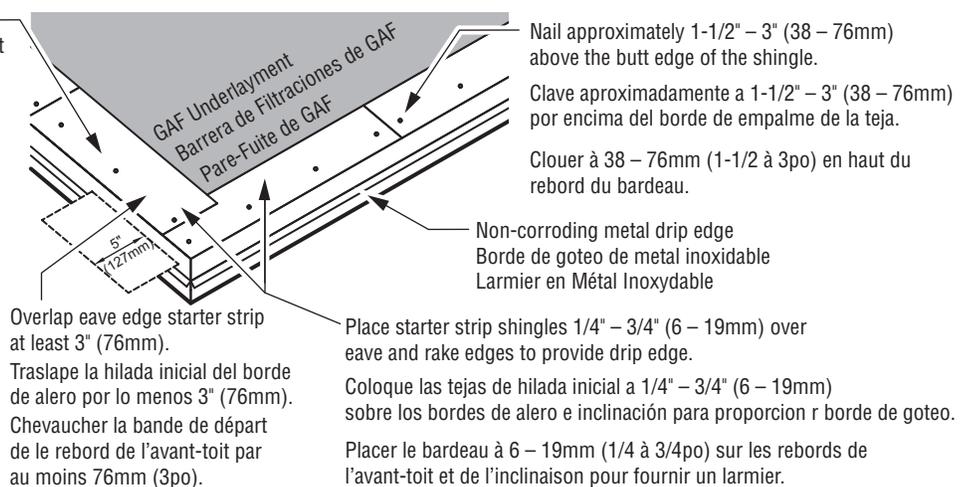
HILADA INICIAL

Use tejas de hilada inicial de GAF en los aleros. Siga las instrucciones de aplicación de tejas de hilada inicial. NOTA: Se recomienda usar tejas de hilada inicial de GAF en las inclinaciones para mejor rendimiento y se requiere para cobertura de la garantía contra el viento en ciertos productos (consulte la garantía limitada para detalles).

For maximum wind resistance along rakes, install any GAF Starter Strip shingles which contain sealant or cement shingles to underlayment and each other in a 4" (102mm) width of asphalt plastic cement.

Para máxima resistencia al viento a lo largo de las inclinaciones, instale cualquier teja de Hilada Inicial de GAF con conteniendo sellador o cemento las tejas a la capa base y entre sí en un ancho de 4" (102mm) de cemento plástico asfáltico.

Pour une résistance maximale contre les vents le long des inclinaisons, installer des bardeaux de Bande de Départ GAF avec scellant ou coller les bardeaux à la membrane de protection et l'un à l'autre dans une largeur de ciment plastique asphalté de 4po (102mm).



INSTALLING SHINGLES

INSTALACIÓN DE TEJAS

FIRST COURSE

Start with full shingle, which **MUST** be nailed on lower nail zone line. Shingle exposure should be 5-5/8" (143 mm)

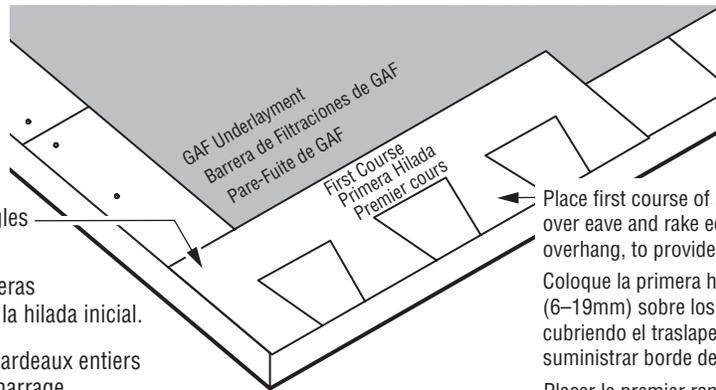
PRIMERA HILADA

Comience con teja completa. La teja completa **DEBE** ser clavado en la línea inferior de la zona de clavo. La exposición de la teja debe ser 5-5/8" (143 mm)

Start at either rake and lay in either direction.

Comience en cualquier inclinación y coloque en cualquier dirección.

Débuter à l'une ou l'autre des inclinaisons et étendre dans les deux directions.



Start and continue with full shingles laid flush over the starter course.

Empiece y continúe con tejas enteras colocadas en forma nivelada con la hilada inicial.

Démarrer et continuer avec des bardeaux entiers définies flush sur le cours de démarrage.

Place first course of shingles 1/4" – 3/4" (6–19mm) over eave and rake edges, covering starter course overhang, to provide drip edge.

Coloque la primera hilada de tejas a 1/4" – 3/4" (6–19mm) sobre los bordes de alero e inclinación, cubriendo el traslape de la hilada inicial, para suministrar borde de goteo.

Placer le premier rang des bardeaux à 6-19mm (1/4 à 3/4po) sur les rebords de l'avant-toit et de l'inclinaison, en couvrant le surplomb du rang de départ, pour fournir un larmier.

SECOND COURSE

Position the shingles in the second and subsequent courses flush with the tops of the wide cut-outs. This results in a 5-5/8" (143 mm) exposure.

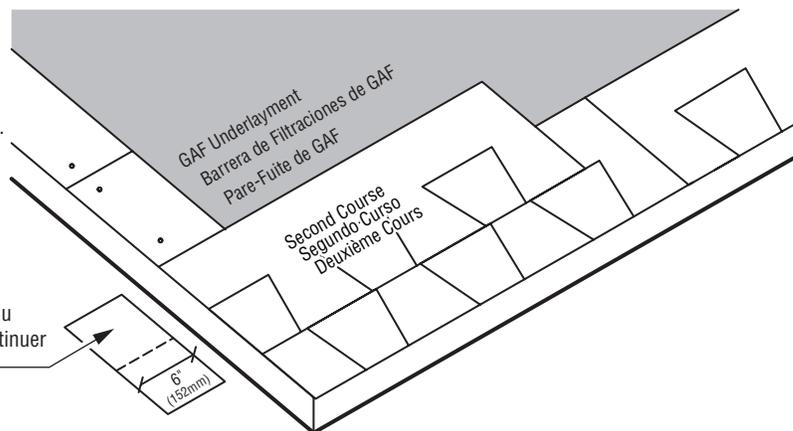
SEGUNDA HILADA

Coloque las tejas en la segunda hilada y subsiguientes a ras con las partes superiores de los cortes amplios. Esto resulta en una exposición de 5-5/8" (143 mm).

Trim 6" (152mm) from rake edge of first shingle. Continue with whole shingles.

Recorte 6" (152mm) del borde de inclinación de la primera teja. Continúe con tejas completas.

Découper à 110mm (152po) du bout du premier bardeau. Continuer avec des bardeaux entiers.

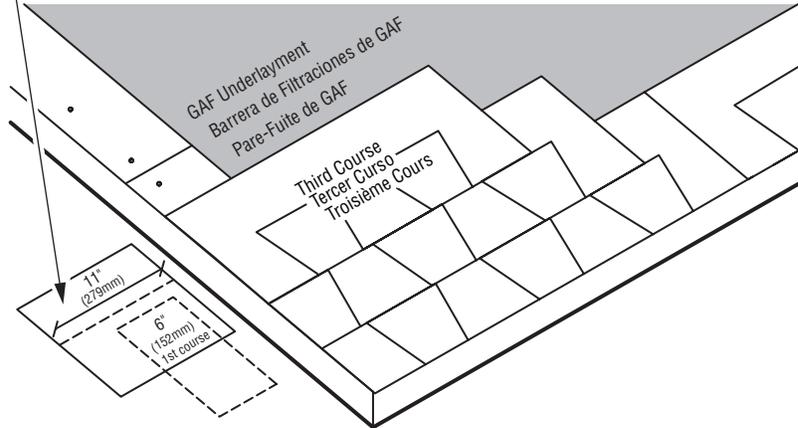


THIRD COURSE TERCERA HILADA

Trim 11" (279mm)
from rake end of first shingle.

Recorte 11" (279mm) del
borde de inclinación
de la primera teja.

Découper à 279mm
(11po) du bout du
premier bardeau.



4TH COURSE AND REMAINING

Strike a chalk line about every 6 courses to check parallel alignment with eaves.

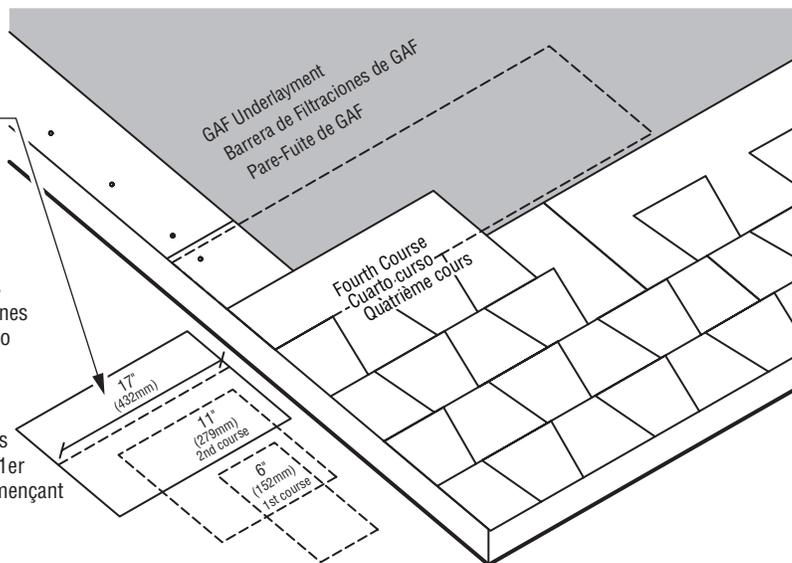
4TA. HILADA Y RESTANTES

Trace una línea de tiza aproximadamente cada 6 hiladas para controlar la alineación paralela con los aleros.

Trim 17" (432mm) from rake end
of first shingle. Continue with whole shingles.
Repeat the 1st - 4th course instructions on
the remaining courses, starting the fifth
course with a full shingle.

Recorte 17" (432mm) del lado que va
al borde en la primera teja. Continúe con tejas
completas. Repita de la 1ra a la 4ta instrucciones
de hilada en las hiladas restantes, comenzando
la quinta hilada con una teja completa.

Découper à 432mm (17po) de la fin de
râteau de premier bardeau. Continuer avec des
bardeaux entiers. Répéter les instructions du 1er
au 4ème rang sur les rangs restants, en commençant
au cinquième rang avec un bardeau entier.



INSTALLING ROOF ACCESSORIES AND DETAILS

INSTALACIÓN DE ACCESORIOS Y DETALLES DE TECHO

VENTILATION

Install GAF ventilation products for optimal shingle life. See General Instructions and the "Through Ventilation" section. Follow the application instructions for the selected ventilation products.

VENTILACIÓN

Instale productos de ventilación de GAF para una óptima vida útil de la teja. Consulte las Instrucciones Generales y la sección "A Través de la Ventilación". Siga las instrucciones de aplicación de los productos de ventilación seleccionados.

RIDGE CAP SHINGLES

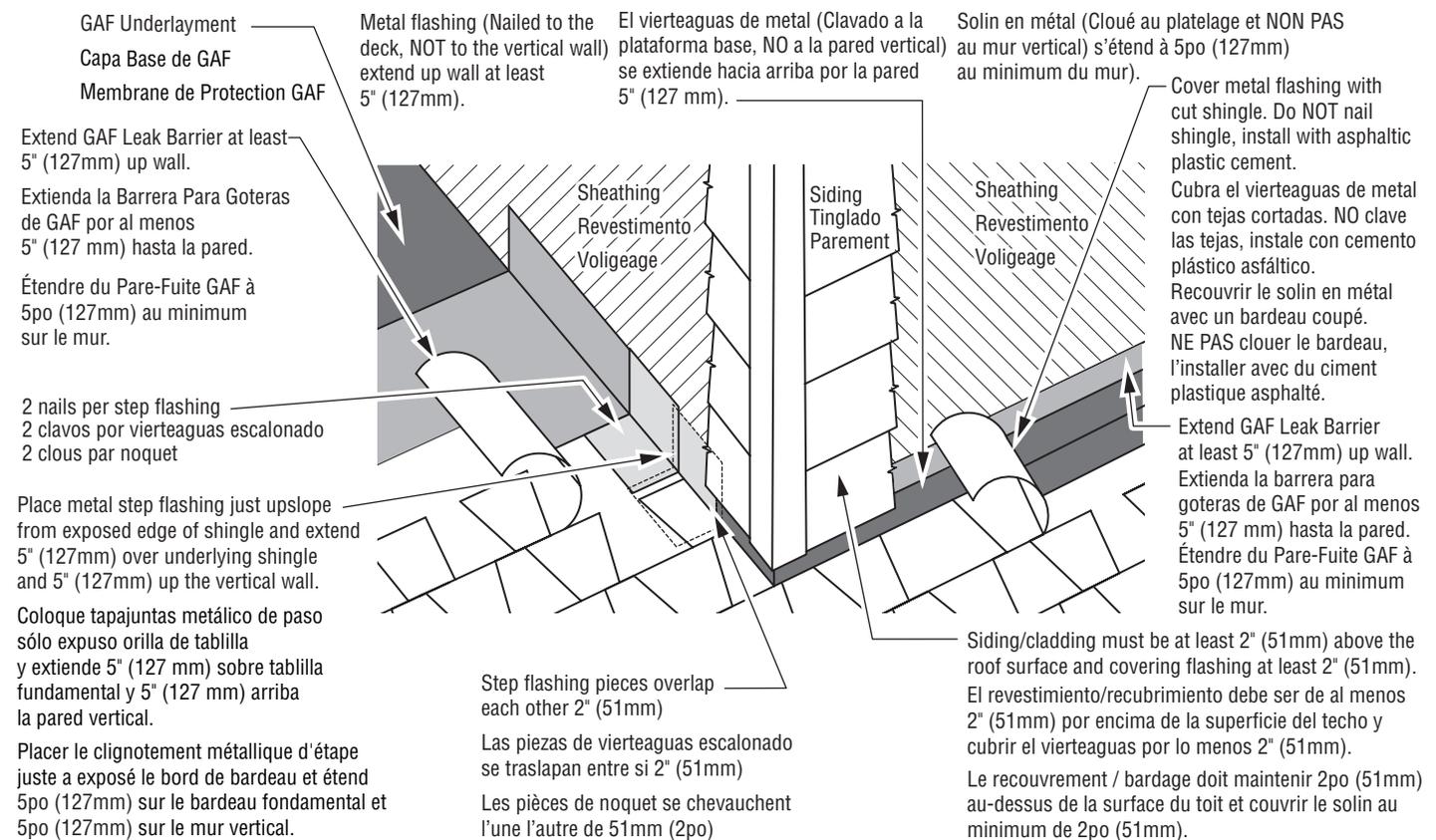
Install GAF Ridge Cap Shingles following the application instructions shown on the GAF Ridge Cap Shingle wrapper. Position laps away from prevailing wind direction.

TEJAS DE CUMBRERA

Instale las tejas de cumbrera de GAF siguiendo las instrucciones de aplicación que figuran en el envoltorio de las tejas de cumbrera de GAF. Coloque los solapes lejos de la dirección del viento predominante.

WALL FLASHING (Sloped Roof to Wall)

VIERTEAGUAS DE PARED (Techo en pendiente hacia la pared)



CHIMNEY FLASHING AND CRICKETS

Cover deck around chimney and over wood crickets with GAF Roof Deck Protection. DO NOT run GAF Roof Deck Protection up sides of chimney. Install leak barrier over GAF Roof Deck Protection and up sides of chimney at least 5" (127 mm). Install shop fabricated metal cricket flashings (shown) after underlayments are installed. Seal shingles to the metal flanges (see drawing below). Treat large wooden crickets like a separate roof and install valleys, shingles, hip and ridge shingles, and step flashing.

VIERTEAGUAS DE CHIMENEA Y DESVIADOR

Cubra alrededor de la chimenea y sobre los desviadores en pino de madera con protección de la cubierta del techo de GAF. NO coloque protección de la cubierta del techo de GAF por los laterales de la chimenea. Instale la barrera contra goteras sobre la protección de la cubierta del techo de GAF y a los costados de la chimenea a un mínimo de 5" (127 mm). Instale los vierteaguas de los desviadores de metal fabricados (que se muestran) después de instalar las capas base. Selle las tejas a las bridas de metal (ver ilustración debajo). Trate los desviadores grandes de madera como un techo por separado e instale los valles, tejas, tejas de cumbres y bordes y vierteaguas de paso.

Extend non-corroding metal counter flashing over base flashing.

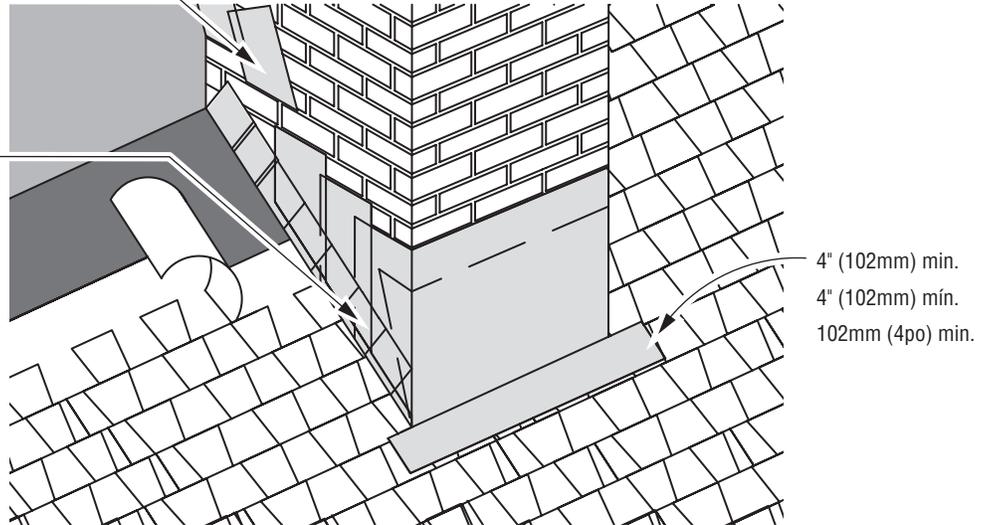
Extienda contravierteaguas de metalinoxidable sobre vierteaguas de base.

Etendre contre solin en metal inoxydable sur le solin de base.

Use one piece metal non-corroding step flashing for each course. Seal overlying shingles to step flashing with asphalt plastic cement.

Utilice un metal de pedazo tapajuntas no-corroendo de paso para cada curso. Selle tablillas que recubre para dar un paso destellar con asfalto cemento plástico.

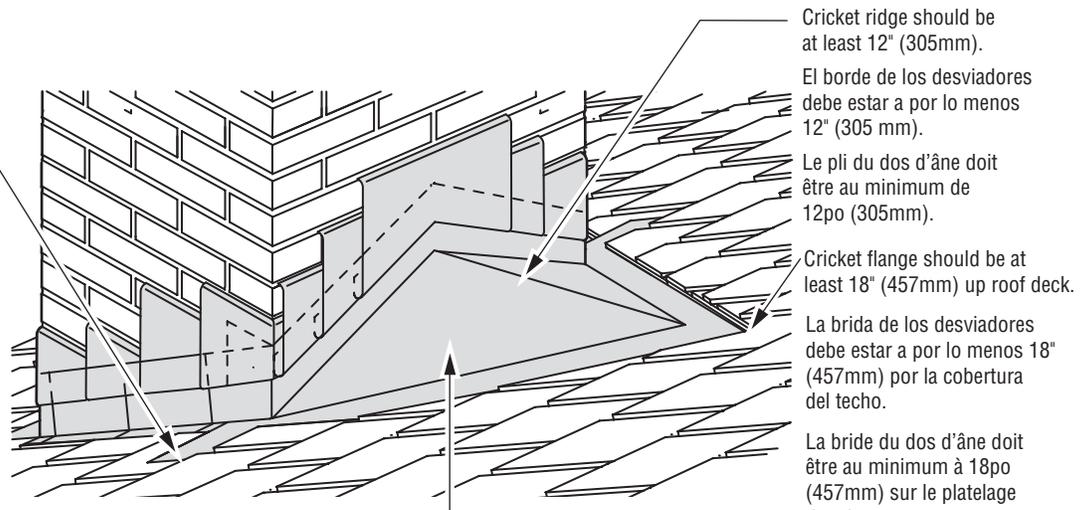
Utiliser un métal de morceau clignotement d'étape non-corrodant pour chaque cours. Sceller des bardeaux recouvrir pour marcher clignoter avec l'asphalte ciment en plastique.



Seal shingles to metal flange with asphalt plastic cement.

Selle las tejas a la brida de metal con cemento del plástico del asfalto.

Sceller les bardeaux à la bride de métal avec du ciment de plastique d'asphalte.



Cricket ridge should be at least 12" (305mm).

El borde de los desviadores debe estar a por lo menos 12" (305 mm).

Le pli du dos d'âne doit être au minimum de 12po (305mm).

Cricket flange should be at least 18" (457mm) up roof deck.

La brida de los desviadores debe estar a por lo menos 18" (457mm) por la cobertura del techo.

La bride du dos d'âne doit être au minimum à 18po (457mm) sur le platelage de toit.

Crickets should extend at least 6" (152mm) up the back of the chimney and extend at least 12" (305mm) up the roof deck.

Los desviadores deben extenderse a por lo menos 6" (152mm) hasta la parte posterior de la chimenea y extenderse a por lo menos 12" (305mm) hasta la cubierta del techo.

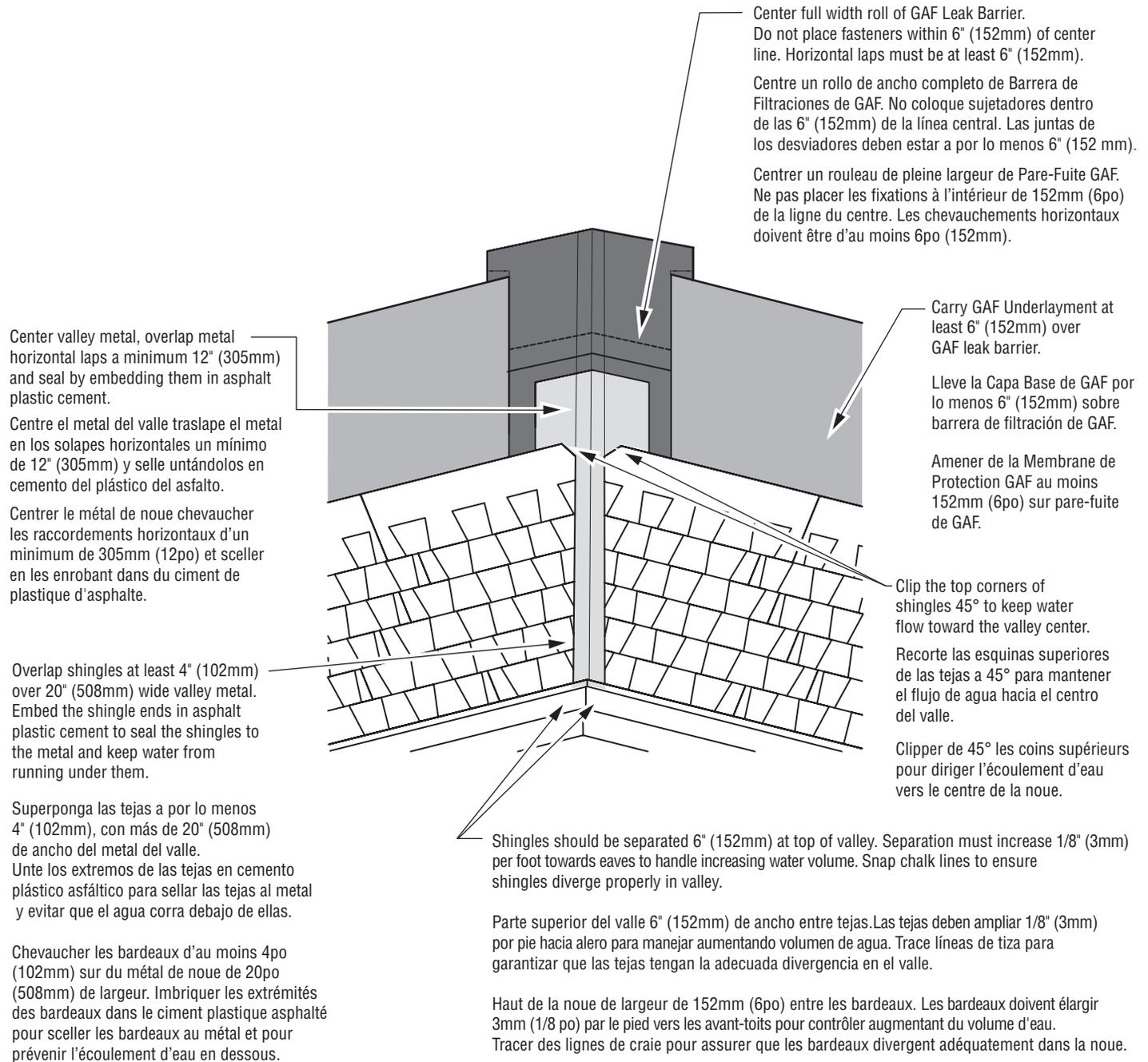
Les dos d'âne doivent s'étendre au minimum de 6po (152mm) vers l'arrière de la cheminée et s'étendre au minimum de 12po (305mm) vers le plan du toit.

VALLEY CONSTRUCTION – OPEN

Use minimum 20" (508 mm) wide aluminum, galvanized steel, copper, or other non-corroding, non-staining metals (24 gauge minimum). Long valleys or local building codes may require wider metal. Nail the metal on the edges so the nail heads hold it in place. Do not puncture the metal. Nailing through the metal may cause leaking and buckling due to movement.

CONSTRUCCIÓN DEL VALLE – DE CORTE ABIERTO

Use un ancho mínimo de 20" (508 mm) de aluminio, acero galvanizado, cobre y otro metal inoxidable que no manche (calibre 24 como mínimo). Los valles largos o los códigos locales de construcción pueden requerir un metal más ancho. Clave el metal en los bordes de modo tal que las cabezas de los clavos sostengan el metal en su lugar. No perforo el metal. Clavar a través del metal puede causar filtraciones y ampollamiento debidos al movimiento.



VALLEY CONSTRUCTION – CLOSED CUT

CONSTRUCCIÓN DEL VALLE – CORTE CERRADO

Extend end of shingle at least 12" (305mm) beyond valley center line. Before nailing, firmly press shingles down at valley center to conform to valley shape. Nail, putting extra fastener in top corner of shingle. Due to the extreme water volume in valleys, nails near the center can leak.

Extienda la teja del extremo por los menos 12" (305mm) más allá de la línea del centro del valle. Antes de clavar, presione firmemente las tejas sobre el centro del valle para ajustarse a la forma del valle. Clavo, poniendo un sujetador adicional en la esquina superior de la teja. Debido al volumen extremo de agua en los valles, los clavos cercanos al centro pueden tener filtraciones.

Étendre le bout du bardeau d'au moins 305mm (12po) dépassé la ligne centrale de la noue. Avant de clouer, appuyer fermement sur le bardeau au centre de la noue pour apparier la forme de la noue. Clouer, en plaçant une fixation additionnelle sur le coin supérieur du bardeau. En raison du volume important d'eau dans les noues, les clous près du centre peuvent causer une fuite.

Carry GAF Underlayment at least 6" (152mm) over GAF Leak Barrier.

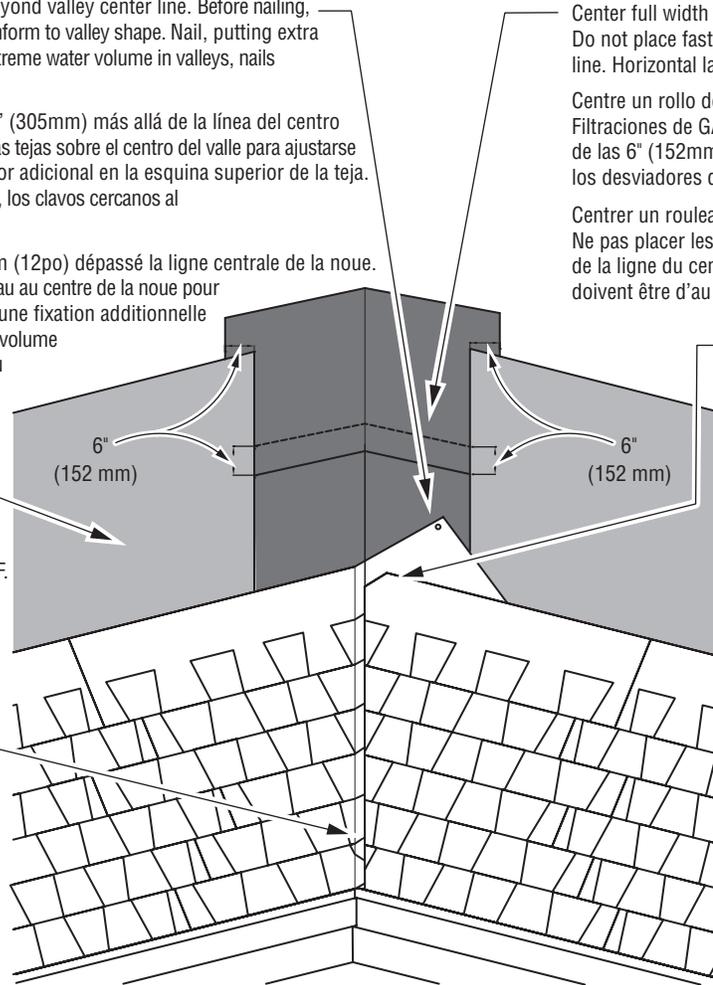
Lleve la Capa Base de GAF por lo menos 6" (152mm) sobre barrera de filtración de GAF.

Amener de la Membrane de Protection GAF au moins 152mm (6po) sur Pare-Fuite de GAF.

Run starter strip across valley at least 12" (305mm) and weave with opposite side starter strip and shingle.

Haga correr la hilada inicial por todo el valle 12" (305mm) como mínimo y entrelace con la hilada inicial y teja de hilada inicial del lado opuesto.

Courir une bande de départ au travers de la noue d'un minimum de 12po (305mm) et joindre avec la bande de départ et le bardeau du côté opposé.



Center full width roll of GAF Leak Barrier. Do not place fasteners within 6" (152mm) of center line. Horizontal laps must be at least 6" (152mm).

Centre un rouleau de ancho completo de Barrera de Filtraciones de GAF. No coloque sujetadores dentro de las 6" (152mm) de la línea central. Las juntas de los desviadores deben estar a por lo menos 6" (152 mm).

Centrer un rouleau de pleine largeur de Pare-Fuite GAF. Ne pas placer les fixations à l'intérieur de 152mm (6po) de la ligne du centre. Les chevauchements horizontaux doivent être d'au moins 6po (152mm).

Overlying shingles must be cut so they are 2" (52mm) away from valley center line. Clip shingle corners 45° to keep water flow in the valley center. Seal the valley shingles to each other using plastic roof cement.

Las tejas superpuestas deben ser cortadas para tener 2" (52 mm) de distancia de la línea central del valle. Recorte las esquinas de las tejas a 45° para mantener el flujo de agua en el centro del valle. Selle las tejas de valle entre sí utilizando cemento plástico para techo.

Les bardeaux qui chevauchent doivent être coupés de sorte qu'ils sont éloignés de 2po (52mm) de la ligne du centre de noue. Clipper les coins de bardeau à 45° pour garder l'écoulement d'eau dans le centre de la noue. Sceller les bardeaux de noue l'un à l'autre avec du ciment plastique asphalté.

CAUTION: Do NOT place nails closer than 6" (152 mm) to the valley center line.

El CUIDADO: NO coloque clavos más cerca que 6" (152mm) al valle la línea central.

PRUDENCE : NE pas placer des clous plus près que 152mm (6po) à la ligne de centre de vallée.

PRECAUTIONARY NOTES

1. Do NOT use on vertical side walls.
2. These shingles are particularly tough and may require additional effort to trim to fit on the roof. Curved blade utility knives are more effective than straight blade utility knives in cutting these shingles. Using a circular saw equipped with carbide-tipped blades is also effective.
3. Asphalt shingles will be stiff in cold weather and flexible in hot weather. Handle carefully. Shingles can easily be broken in cold weather or their edges damaged in hot weather. Do not drop bundles on edges or on other bundles to separate shingles. Do not load bundles across a hip or ridge. Do not bend bundles over shoulder for carrying. Premium shingles with heavier weight may cause cracks at sharp bend points.
4. Store on flat surface in a covered, ventilated area with a maximum temperature of 110°F (43°C). Do not store near steam pipes, radiators, etc., or in sunlight. Do not store double-stacked pallets on a long-term basis. If double stacking is required for short periods, use slip sheets of 1/2" (13 mm) plywood cut to the pallet size to minimize damage. Long-term double-stacked storage, especially in hot weather, can result in possible sticking, staining, and distortion of the shingles.

RE-ROOFING: If old asphalt shingles are to remain in place, nail down or cut away all loose, curled, or lifted shingles and replace with new, and just before installing the new roofing, sweep the surface clean of all loose debris. Since any irregularities may show through the new shingles, be sure the underlying shingles provide a smooth surface. Fasteners must be long enough to penetrate the wood deck at least 3/4" (19 mm) or just through plywood. Follow shingle installation instructions for installation.

NOTE: Shingles can be applied over wood shingles if the surface can be made smooth enough. This may include cutting back old shingles at eaves and rakes, installing new wood edging strips as needed, and the use of beveled wood strips. Install Type 30 underlayment to maintain a ANSI/UL 790 Class A roofing fire rating.

IMPORTANT: Repair leaks promptly to avoid adverse effects, including mold growth.

For general technical support, visit our website at gaf.com or call 1-800-766-3411.

NOTAS DE PRECAUCIÓN

1. NO utilice este producto en paredes laterales verticales.
2. Los cuchillos de utilería con filo curvo son más efectivos que los de filo recto para cortar estas tejas. Utilizar una cierra circular con cuchillas de puntas de carburo es también muy efectivo. Independientemente de la herramienta que se utilice, use siempre un equipo de protección apropiado, como guantes, protección ocular, etc. En caso de que se genere polvo o se eliminen gases, le recomendamos usar una protección respiratoria adecuada. Consulte la Hoja de datos de seguridad (Safety Data Sheet, SDS) para mayor información y siga todos los procedimientos de seguridad indicados.
3. Debido a la naturaleza de las tejas asfálticas, estas son rígidas en climas fríos y flexibles en climas cálidos. Manipule este producto con precaución. Las tejas pueden romperse con facilidad en climas fríos, o bien sus bordes pueden dañarse en climas cálidos. No deje caer los paquetes sobre los bordes ni sobre otros paquetes para separar las tejas. No cargue paquetes sobre techos a cuatro aguas ni sobre las cumbres. No se incline para cargar y transportar los paquetes en el hombro. Las tejas de calidad superior con mayor peso pueden agrietarse en curvas pronunciadas.
4. Almacene este producto sobre una superficie plana en un área cubierta y ventilada con una temperatura máxima de 110°F (43°C). No almacene cerca de tuberías de vapor, radiadores, etc., ni bajo la luz solar directa. No almacene el producto apilado en palés durante un período prolongado. Si es necesario almacenar el producto apilado en palés durante períodos cortos, utilice láminas deslizantes de madera contrachapada de 1/2" (13 mm) entre medio de los palés para reducir los daños. El almacenamiento del producto apilado en palés durante largos períodos, especialmente en climas calurosos, puede causar posibles adherencias, manchas y deformación de las tejas.

RETECHADO: Si las tejas asfálticas antiguas deben permanecer en su lugar, desclave o corte todas las tejas flojas, onduladas o levantadas y reemplácelas por tejas nuevas. Justo antes de instalar el techo nuevo, limpie la superficie hasta que no haya partículas sueltas. Dado que cualquier irregularidad puede ser visible a través de las tejas nuevas, asegúrese de que las tejas de la base brinden una superficie plana. Los sujetadores deben tener la longitud suficiente para penetrar al menos 3/4" (19 mm) la cubierta de madera o solo a través de la cubierta de madera contrachapada. Siga las instrucciones de instalación de tejas para una correcta instalación.

NOTA: Las tejas pueden aplicarse sobre tejas de madera siempre que la superficie esté lo suficientemente lisa. Esto puede implicar cortar tejas viejas en aleros y desniveles, instalar ribetes de borde de madera nuevos según sea necesario y colocar listones de madera biselados. Instale una capa base Tipo 30 para mantener una calificación contra incendios en techos Clase A, según lo establecido por la norma ANSI/UL 790.

IMPORTANTE: Repare las goteras rápidamente para evitar efectos adversos como el crecimiento de moho.

Para obtener soporte técnico general, visite nuestro sitio web es.gaf.com, o bien llame al 1-800-766-3411.

SECTION 076200 - Sheet Metal Flashing and Trim

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sheet metal flashing and trim in the following categories:

1. Exposed trim.
2. Metal flashing.
3. Reglets.
4. Metal crickets.
5. Pipe boots for metal roofing panels.

1.2 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

1.3 SUBMITTALS

A. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

1. Identify material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work..

C. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.

1. 8-inch- (200-mm-) square Samples of specified sheet materials to be exposed as finished surfaces.
2. 12-inch- (300-mm-) long Samples of factory-fabricated products exposed as finished Work. Provide complete with specified factory finish.

D. 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.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.6 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 METALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:

1. Aluminum Sheet: ASTM B 209, Alclad 3003-H14, with a minimum thickness as indicated in fabricated.
2. Extruded Aluminum: ASTM B 221, alloy 6063-T52, with a minimum thickness of 0.080 inch for primary legs of extrusions, unless otherwise indicated.

2.2 MANUFACTURED PRODUCTS

A. General: Provide items designed and fabricated to fit applications indicated and to perform optimally with respect to weather resistance, water tightness, durability, strength, and uniform appearance.

B. Expansion Provisions: Fabricate running lengths to allow controlled expansion not only for movement of metal components in relationship to one another but also to adjoining dissimilar materials, including flashing and roofing membrane materials, in a manner sufficient to prevent water leakage, deformation or damage..

C. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

1. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
2. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
3. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
5. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
6. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
7. Material: Fabricate reglets from the following metal in thickness indicated:
 - a. Aluminum, 0.024 inch (0.6 mm) thick.

8. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Fry Reglet Corporation.
 - b. Hickman: W .P. Hickman Co.
 - c. Keystone Flashing Company.
 - d. MM Systems.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.
- B. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.
- C. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- D. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."
- E. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
- F. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- G. Slip Sheet: 5-lb. rosin-sized building paper or Tyvek by DuPont.
- H. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
- I. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based..

2.4 FABRICATION, GENERAL

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
- B. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- C. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches (600 mm)of corner or intersection. Where lapped or bayonette type

expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25.4 mm) deep, filled with mastic sealant (concealed within joints.)

D. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

E. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

F. Conceal fasteners and expansion provisions unless noted otherwise. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

G. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.5 SHEET METAL FABRICATIONS

A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

B. Exposed Trim and Crickets: Fabricate from the following material:

1. Aluminum: 0.050 inch (1.27 mm) thick.

C. Base Flashing, Valley Flashing, Step Flashing: Fabricate from the following material:

1. Aluminum: 0.040 inch (1 mm) thick

D. Counterflashing, Flashing Receivers: Fabricate from the following material:

1. Aluminum: 0.0320 inch (0.813 mm) thick.

2.6 ALUMINUM FINISHES

A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

B. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
2. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be

installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

F. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

G. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
2. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.

H. Install reglets to receive counterflashing according to the following requirements:

1. Where reglets are shown in concrete, furnish reglets for installation under Division 3 Section "Cast-in-Place Concrete."
2. Where reglets are shown in masonry, furnish reglets for installation under Division 4 Section "Unit Masonry."

I. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches (50 mm) and bed with sealant.

3.3 MANUFACTURED PRODUCTS

A. General: Comply with manufacturer's written installation instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive work of this Section, with vapor retarders, roof insulation, roofing membrane, flashing, and wall construction; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor products included in this Section securely to structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 076200

SECTION 078448 - Fire Resistive Joint Systems

PART 1 - GENERAL

1.1 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.
5. Construction enclosing compartmentalized areas.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for construction of openings in concrete slabs and walls.
2. Division 7 Section "Sprayed Fire-Resistive Materials."
3. Division 15 Sections specifying duct and piping penetrations.
4. Division 16 Sections specifying cable and conduit penetrations.

C. Locations of rated walls, floors, and ceilings are indicated on the Life Safety Drawings, and other drawings in the contract documents. Fire ratings of floor, wall, roof and ceiling assemblies are indicated on the title sheet code analysis, and other drawings in the contract documents.

1.2 DEFINITIONS

A. Firestopping: The use of a material or combination of materials in a fire-rated wall or floor where it has been breached, so as to restore the integrity of the fire rated assembly.

B. System: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction assembly and a specific penetrant(s) or gap condition, constitutes a system.

C. Barrier: A wall or floor assembly that has an hourly fire or smoke rating.

D. Through-Penetration: Any penetration of a fire-rated or smoke rated wall or floor that completely breaches the barrier.

E. Membrane-Penetration: Any penetration of a fire-rated or smoke rated wall or floor that breaches only one side of the barrier.

F. Construction Gaps: Any gap, joint, or opening, weather static or dynamic, where the top of a wall may meet a floor; wall to wall applications; edge to edge floor configurations; floor to exterior wall; or any linear breach in a rated barrier.

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 load-bearing walls, including partitions, with fire-protection-rated openings.
2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
3. Fire-resistance-rated floor 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- (100-mm-) diameter nominal pipe or 16 sq. in. (100 sq. cm) 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 (100 mm) 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.

C. Firestopping Submittal Form attached at the end of this section, indicating the U.L. design test for each condition that exists.

1. Attach UL test reports or test reports from a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on the condition indicated for each penetrant and condition.

D. 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.

E. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

F. 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 has completed through-penetration firestop systems 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. 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.
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 the UL in "Fire Resistance Directory."

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 applicable; 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. Schedule firestopping after installation of roofing and the building is enclosed.

D. Complete firestopping prior to finishing of gypsum drywall.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3.

1. Through-Penetration Firestop Systems specified in the Schedule in Part - 3 include:

- a. Fire Barrier Products, 3M Fire Protection Products
- b. International Protective Coatings Corp.

2. Subject to compliance with specified requirements, provide Through-Penetration Firestop Systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory (BXRH), by one of the following:

- a. Fire Barrier Products, 3M Fire Protection Products
- b. International Protective Coatings Corp.
- c. Hilti Firestop Systems
- d. Bio Fireshield, The RectorSeal Corporation.
- e. SpecSeal Products, Specified Technologies, Inc.

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 firestop 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. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. 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.

I. 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.

J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 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.

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, Through-Penetration Firestop Systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory (BXRH), 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.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

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 firestop systems

complying with specified requirements.

3.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Where alpha-alpha-numeric designations are indicated, provide system described in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Schedule of construction components, type of penetrant, and U.L. Through-penetration Firestop Systems include, but are not limited to the following:

C. Membrane Penetrations:

1. Firestop membrane penetrations by cables, pipes and conduit similar to through wall penetrations.
2. Provide putty pad box wrap firestopping for membrane penetrations in rated walls for electrical back boxes over 16 sq. inches, where any back boxes are located within 24 inches horizontal of another back box, or when total area of back boxes exceeds 100 sq in. in 100 sq. ft. of wall area.

D. Where another type of construction or penetrant is encountered, or if field conditions vary from those described in the U.L. System listed (i.e. annular space is greater/smaller, insulation type varies, etc.), provide firestopping systems which are appropriate, and U.L. tested, for that condition.

END OF SECTION 078448

SECTION 079000 - Joint Sealants

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes joint sealants for the following locations:

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 cast stone trim units (water tables, sills, etc).
 - c. Joints in manufactured stone veneer.
 - d. Joints in exterior siding.
 - e. Joints in exterior trim.
 - f. Joints between different materials listed above
 - g. Perimeter joints between materials listed above and frames of doors and windows.
 - h. Control and expansion joints in ceiling and overhead surfaces.
 - i. Other joints as indicated.
2. Exterior joints in the following horizontal traffic surfaces:
 - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - b. Joints between architectural precast concrete paving units.
 - c. Joints between different materials listed above.
 - d. 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. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - d. Tile control and expansion joints.
 - 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. Tile control and expansion joints.
 - h. Other joints as indicated.
4. Interior joints in the following horizontal traffic surfaces:
 - a. Control and expansion joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - c. Other joints as indicated.

B. Related Sections include the following:

1. Sealants used in glazing are specified in Division 8 "Glazing."
2. Sealants used with firestopping systems are specified in Division 7 "Firestopping."
3. Coordinate work of this section with all sections referencing it.

1.2 SYSTEM 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.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

1. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.

B. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

C. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch (13-mm) wide joints formed between two 6-inch (150-mm) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

E. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project names addresses, names of Architects and Owners, plus other information specified.

F. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

G. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.

H. Preconstruction field test reports indicating which products and joint preparation methods demonstrate acceptable adhesion to joint substrates.

I. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an installer who has successfully completed at least three (3) joint sealer applications similar in type and size to that of this project within the last five (5) years. All workers used for work of this Section shall be experienced in the techniques of sealant application and shall be completely familiar with the published recommendations of the manufacturer of the joint sealant materials being used.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of non-elastomeric sealant and joint substrate indicated.
3. Notify Architect one week in advance of the dates and times when mock-ups 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 inches (1500 mm) joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
 - b. Make knife cuts horizontally from one side of joint to the other followed by 2 vertical cuts approximately 2 inches (50 mm) long at side of joint and meeting horizontal cut at top of 2-inch (50-mm) cuts. Place a mark 1 inch (25 mm) from top of 2-inch (50-mm) piece.
 - c. Use fingers to grasp 2-inch (50-mm) piece of sealant just above 1-inch (25-mm) mark; pull firmly down at a 90-degree angle or more 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.
6. Report whether or not 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.
7. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

D. Field-Constructed Mock-Ups: Prior to installation of joint sealants, apply elastomeric sealants as follows to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution:

1. Joints in field-constructed mock-ups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants specified in this Section.

E. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of the Division 1 Section covering this activity.

1.5 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 period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4 deg C).
2. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.7 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.8 EXTRA MATERIALS

A. Extra Materials: Furnished from same production run as sealants installed. Package materials with protective covering and identify with labels describing contents. Deliver extra materials to Owner.

1. Furnish 2 cases of each color of sealant provided in the Work

1.9 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, joint fillers, 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: Provide color of exposed joint sealants to comply with the following:

1. Provide selections made by Architect from manufacturer's standards or custom colors to match Architect's samples, as directed by Architect.

C. Additional Movement Capability: Where additional movement capability is specified, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.

2.2 LATEX JOINT SEALANT

A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, mildew-resistant, paintable latex acrylic-emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent.

1. Available Products: Subject to compliance with requirements, latex joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. Chem-Calk 600; Bostik Inc.
 - b. AC-20; Pecora Corporation.
 - c. Tremflex 834; Tremco.
 - d. Sonolac; Sonneborn Building Products Div., ChemRex, Inc.

B. Uses: General interior use, paintable..

2.3 MILDEW-RESISTANT SILICONE JOINT SEALANT - Type S-1

A. Single-Component Mildew-Resistant Silicone Sealant: Manufacturer's standard, nonmodified, one-part, silicone sealant; complying with ASTM C 920, Type S, Grade NS, Class 25, Uses NT, G, A, and, as applicable to non-porous joint substrates indicated, O. Formulate sealant with fungicide and specifically intended for sealing interior joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.

1. Available Products: Subject to compliance with requirements, silicone joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. 786 Mildew Resistant; Dow Corning.
 - b. Sanitary 1700; GE Silicones.
 - c. 898 Silicone Sanitary Sealant; Pecora Corporation.
 - d. Tremsil 600 White; Tremco.

B. Uses: Interior use in wet locations, and all toilet and shower rooms.

2.4 NONSAG URETHANE JOINT SEALANT

A. Multicomponent Nonsag Urethane Sealant: Manufacturer's standard, non-modified, multipart, nonsag urethane sealant; complying with ASTM C 920, Type M, Grade NS, Class 25, Uses NT, M, G, A, and as applicable to joint substrates indicated, O.

1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. Chem-Calk 2641; Bostik Inc.
 - b. Dynatrol II, Pecora Corporation
 - c. Sikaflex-2c NS, Sika Corporation
 - d. DYmeric 511; Tremco.
 - e. NP 2; Sonneborn Building Products Div., ChemRex Inc.

B. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.

C. Uses: General exterior use and interior use for exposed concrete or masonry wall control joints

2.5 POURABLE URETHANE JOINT SEALANT

A. Multicomponent Pourable Urethane Sealant: Manufacturer's standard, non-modified, twopart, urethane sealant; complying with ASTM C 920, Type M, Grade P, Class 25, Uses T, M, A and, as applicable to joint substrates indicated, O.

1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:

- a. Chem-Calk 550; Bostik Inc.
- b. NR-200 Urexpan, Pecora Corporation
- c. Sikaflex 2c SL, Sika Corporation
- d. SL 2; Sonneborn Building Products Div., ChemRex Inc.

B. Uses: Interior or exterior use for level pavement or slab joints.

2.6 NONSAG URETHANE JOINT SEALANT

A. Multi-Part Non-Sag Urethane Sealant: Except as otherwise indicated, provide manufacturer's standard, non-modified, two-part, urethane sealant; complying with ASTM C 920, Type M, Grade NS, Class 25, Uses T, M, A and, as applicable to joint substrates indicated, O.

1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:

- a. Chem-Calk 2641; Bostik Inc.
- b. Dynatred, Pecora Corporation
- c. NP 2; Sonneborn Building Products Div., ChemRex Inc.

B. Uses: Interior or exterior use for pavement or slab joints where slope exceeds one percent.

2.7 ACOUSTICAL JOINT SEALANTS - Type AS-1

A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

1. 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.

2. Available Products: Subject to compliance with requirements, acoustical joint sealants that may be incorporated in the Work include, but are not limited to, the following:

- a. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corporation.
- b. SHEETROCK Acoustical Sealant; USG Corp., United States Gypsum Co.

B. Uses: Interior acoustically sealed joints exposed or exposed above ceilings.

2.8 ACOUSTICAL JOINT SEALANTS - Type AS-2

A. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant

recommended for sealing interior concealed joints to reduce transmission of airborne sound.

1. Available Products: Subject to compliance with requirements, acoustical joint sealants that may be incorporated in the Work include, but are not limited to, the following:

- a. BA-98; Pecora Corporation.
- b. Tremco Acoustical Sealant; Tremco.

B. Uses: Concealed interior acoustically sealed joints at metal stud tracks.

2.9 PREFORMED FOAM SEALANTS

A. Preformed Foam Sealants: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:

1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
2. Impregnating Agent: Chemically stabilized acrylic.
3. Density: Manufacturer's standard.
4. Backing: None.
5. Available Products: Subject to compliance with requirements, preformed foam sealants that may be incorporated in the Work include, but are not limited to, the following:
 - a. "Emseal," Emseal Corp.
 - b. "Emseal Greyflex," Emseal Corp.
 - c. "Wil-Seal 150," Wil-Seal Construction Foams Div., Illbruck.
 - d. "Wil-Seal 250," Wil-Seal Construction Foams Div., Illbruck.

2.10 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. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-staining, non-waxing, Non-extruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, Non-outgassing in unruptured state.
2. Manufacturer: Provide Cera-Rod manufactured by W.R. Meadows, Inc., or equivalent.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as 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.

2.11 JOINT FILLERS FOR EXTERIOR CONCRETE SLABS

A. General: Provide joint fillers of thickness and depth indicated, or if not indicated 1/2" thick by depth of joint.

B. Bituminous Fiber Joint Filler: Provide preformed strips of with asphalt binder encased between two layers of saturated felt or glass-fiber felt, complying with ASTM D 1751.

1. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint and seal with sealant.

2.12 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 in any way joint substrates and adjacent nonporous surfaces, 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. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer 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 concrete, masonry, unglazed surfaces of ceramic tile, and similar 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.

3. Remove laitance and form release agents from concrete.

4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other 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.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. 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 printed installation instructions applicable to products and applications indicated, except where 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. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated 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.

a. Do not leave gaps between ends of joint fillers.

b. Do not stretch, twist, puncture, or tear joint fillers.

c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

D. Installation of Sealants: 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 widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
2. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.

F. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they 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 that and installations with repaired areas are indistinguishable from original work.

END OF SECTION 079000

SECTION 081113 Hollow Metal Doors and Frames

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Steel doors.
2. Steel door frames.
3. Borrowed-light frames.
4. Fire-rated door and frame assemblies.

B. Related Sections include the following:

1. Division 4 Section "Unit Masonry Assemblies" for installing anchors and grouting frames in masonry construction.
2. Division 8 Section "Flush Wood Doors" for wood doors installed in steel frames.
3. Division 8 Section "Door Hardware" for door hardware and weatherstripping.
4. Division 8 Section "Glazing" for glass in glazed openings in doors and frames.
5. Division 9 Section "Gypsum Board Assemblies" for spot-grouting frames installed in steel-framed gypsum board partitions.
6. Division 9 Section "Painting" for field painting factory-primed doors and frames.

1.2 SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

B. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.3 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

B. Fire-Rated Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.

1. Test Pressure (Positive Pressure Doors): Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches (1000 mm) or less above the sill.

C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.4 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to permit air circulation.

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. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. DeLaFontaine
5. Pioneer Industries, Inc.
6. Steelcraft; an Ingersoll-Rand company
7. Windsor Republic Doors.
8. Nucor Building Systems – Exterior Doors

2.2 MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 35 percent.

B. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

D. Galvannealed-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A60 (ZF180) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

2.3 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. 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:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), 16 ga., 0.053-inch- (1.3-mm-) thick faces, Model 1 (Full Flush).

C. 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:

1. Level 4 and Physical Performance Level A (Maximum Duty), 14ga., 0.067-inch- (1.7-mm-) thick faces, Model 2 (Seamless), for all other locations.

D. Vision Lite Systems: Manufacturer's standard kits consisting of glass lite moldings to accommodate glass thickness and size of vision lite indicated.

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. Level 3 frames of 16ga., 0.053-inch- (1.3-mm-) thick steel sheet for:

1. Wood doors, unless otherwise indicated.

C. Level 3 frames of 14ga., 0.067-inch- (1.7-mm-) thick steel sheet for:

1. Level 3 steel doors.
2. Wood doors at all leafs wider than 36-inches (914-mm), and all electrical rooms, storage rooms, machine rooms, mechanical rooms, and maintenance areas.

D. Level 4 frames of 12ga., 0.093-inch- (2.3-mm-) thick steel sheet for:

1. Level 4 steel doors.

E. Supports and Anchors: Provide jamb anchors as required to secure frames to adjacent construction, formed from not less than 0.0598-inch- (1.5-mm-) thick sheet steel (galvannealed steel where used with galvannealed steel frames), in accordance with UL tests and as follows:

1. Masonry Construction: Adjustable, flat or corrugated strap and stirrup welded to frame, to suit frame size, not less than 2 inches (50 mm) wide by 10 inches (250 mm) long. Provide at least 3 anchors per jamb up to 90 inches (2250 mm) in height, 4 anchors up to 96 inches (2400 mm) in jamb height, and 1 additional anchor for each 24 inches (600 mm) or fraction thereof over 96 inches (2400 mm) in height.
2. Metal-Stud Partitions: Insert type with notched clip to engage metal stud, welded to back of frames. Provide at least 3 anchors for each jamb for frames up to 90 inches (2250 mm) in height, 4 anchors up to 96 inches (2400 mm) in jamb height, and 1 additional anchor for each 24 inches (600 mm) or fraction thereof over 96 inches (2400 mm) in height.
3. In-Place Concrete or Masonry (Existing Opening Anchor): Anchor frame jambs with minimum 3/8-inch (9-mm) concealed bolts into expansion shields or inserts 6 inches (150 mm) from top and bottom and 26 inches (650 mm) o.c., unless otherwise shown. Reinforce frames at anchor locations. Apply auto body compound to cover anchor bolts, unless otherwise indicated.
4. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.

F. Floor Anchors: Provide clip-type adjustable floor anchors formed of not less than 0.0747-inch- (1.9-mm-) thick galvanized sheet, with 2 holes to receive fasteners at both floor and frame, and reinforced frame channel welded to bottom of jambs and mullions at frame attachment point for each jamb and mullion that extends to floor.

G. Door Silencers: Except on weather-stripped and fire-rated frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

H. Plaster Guards: Provide 0.016-inch- (0.4-mm-) thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

I. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

J. Rain Drips: Provide 12 ga., 0.108-inch- (2.8-mm-) thick galvanized steel drip secured to frame with stainless steel fasteners and set in sealant, at exterior doors that are not covered by canopies.

2.5 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and 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.

B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from galvanized-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 16ga., 0.053-inch.- (1.3-mm-) thick, galvanized-coated steel channels with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.

C. Interior Door Faces, and Frames: Fabricate exposed faces of doors, frames and panels, including stiles and rails of nonflush units, from the following material:

1. Cold-rolled steel sheet, except as indicated below.
2. Galvanized-coated steel sheet at the following locations:
 - a. Any location indicated on door schedule.

D. Core Construction: One of the manufacturer's standard core materials that produce a door complying with SDI standards and thermal ratings indicated.

E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom.

F. Clearances for Fire-Rated Doors: As required by NFPA 80.

G. Single-Acting, Door-Edge Profile: Beveled square edge for doors with mortise lockset and beveled edge for non mortised locksets.

H. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for 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. Thermal-Rated (Insulating) Assemblies: At exterior locations and other locations 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 0.10 Btu/sq. ft. x h x deg F (57 W/sq. m x K)] or better.

L. 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 in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

M. Frame Construction: Fabricate frames to shape shown.

1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
2. Knock-down frames are not permitted.
3. Provide welded frames with temporary spreader bars.

N. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

O. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

P. Glazing Stops: Manufacturer's standard, formed from 0.032-inch- (0.8-mm-) thick steel sheet.

1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.

Q. Astragals: As required by NFPA 80 to provide fire ratings indicated.

2.6 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

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 in 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 walls or partitions, place frames before construction of enclosing walls and ceilings.
2. Masonry Walls: Provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
3. Existing Concrete or Masonry Construction: Provide at least three completed opening anchors per jamb; install 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. Metal-Stud Partitions: Provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws. Solidly pack mineral-fiber insulation behind frames
5. Install fire-rated frames according to NFPA 80.
6. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.
7. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.

C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

1. Fire-Rated Doors: Install within clearances specified in NFPA 80.
2. Smoke-Control Doors: Install to comply with NFPA 105.

3.2 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Adjust doors for proper operation, free from binding or other defects.

C. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 081113

SECTION 081416 Flush Wood Doors

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Solid-core doors with hardboard or MDF faces.
2. Solid core wood composite ("Masonite") doors.
3. Factory prime painting doors.
4. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Division 8 Section " Steel Doors and Frames" for steel door frames.
2. Division 8 Section "Glazing" for glass vision panels in flush wood doors.

1.2 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction, and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; 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 finish requirements.
4. Indicate fire ratings for fire doors.
5. Provide schedule of doors based on door schedule included in contract documents

C. Product Certificates: Provide certificate of suitability from manufacturer of flush wood doors, signed by President or Chief Officer of company, stating that all flush wood doors provided for this Project are suitable for their intended use, and may be installed without limitation to warranty within the existing and designed environmental conditions of the Project's building.

1.3 QUALITY ASSURANCE

A. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated," including Section 1300 "Architectural Flush Doors", for grade of door, core construction, finish and other requirements, unless more stringent requirements are indicated in this Section.

B. Fire-Rated Wood Doors: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.

1. Test Pressure (Positive Pressure Doors): Test according to NFPA 252 or UL 10C. After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches (1000 mm) or less above the sill.
 - a. Provide "Category A" Positive Pressure Tested doors.

C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

D. Source Limitations: Obtain flush wood doors through one source from a single

manufacturer.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

1. Break seal on site to permit ventilation.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.5 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.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span.

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 from date of Substantial Completion:
 - a. Solid-Core Flush Interior Doors: Life of installation.
 - b. Wood Composite Doors: 5 years

B. Contractor's Responsibilities: Replace doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flush Wood Doors:
 - a. Algoma Hardwoods Inc.
 - b. Eggers Industries; Architectural Door Division.
 - c. Marshfield Door Systems, Inc. (Formerly Weyerhaeuser door division)
 - d. Oshkosh Architectural Door Co.
2. Wood Composite Panel Doors: Masonite International Corp. or equal.

2.2 DOOR CONSTRUCTION, GENERAL

A. Flush Wood Doors for Opaque Finish:

1. Grade: Custom.
2. Faces for Interior Doors: Hardboard or MDF.

- a. Hardboard Faces: AHA A135.4, Class 1 (tempered) or Class 2 (standard).
- b. MDF Faces: ANSI A208.2, Grade 150 or 160.

B. Facing Adhesive: Type I , waterproof.

2.3 SOLID-CORE DOORS

A. Interior Solid-Core Doors, Flush, Non-Rated:

1. Core: Particleboard: ANSI A208.1, Grade LD-2.
2. Construction: Hot press five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering; PC-5 ME (Particleboard core, hot press 5-ply, vertical edges same species as face, lumber or veneer).
3. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware, and as follows:
 - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
 - b. 5-inch (125-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
 - d. Additional blocking required for installation of specified door hardware.

B. Fire-Rated Flush Wood Doors:

1. Core for Fire-Rated Doors: Mineral core.
2. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated. FD-5 ME (Mineral core, hot press 5-ply, vertical edges same species as face, lumber or veneer).
3. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as needed to eliminate through-bolting hardware, and as follows:
 - a. 5-inch (125-mm) top-rail blocking.
 - b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
 - d. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
 - e. Additional blocking required for installation of specified door hardware.
4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile matching face veneer, and laminated backing at hinge stiles for improved screw-holding capability and split resistance.
5. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without exposed formed-steel edges and astragals. Provide stiles with concealed intumescent seals.

C. Wood Composite Panel Doors:

1. Basis of Design Product: Masonite Molded Panel Series, Two Panel design
2. Core Construction: "Safe 'N Sound" solid core construction.
3. Surface Texture: Smooth.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Non-Rated Wood Doors: Manufacturer's standard shape, wood species same as door faces.

B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

2.5 FABRICATION

A. 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 in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, 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.

C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

1. Light Openings: Trim openings with moldings of material and profile indicated.

D. Bond stiles and rails to cores. Sand bonded core prior to applying crossbanding and face veneers.

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 9 Section "Painting". Seal all four edges, edges of cutouts, and mortises with primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and 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 level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Manufacturer's Written Instructions: Install 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.
2. Install smoke-control doors and frames in compliance with NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING

A. Rehang or replace doors that do not swing or operate freely.

END OF SECTION 081416

SECTION 083113 Access Doors and Frames

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes access doors for installation in the following locations:

1. Wall access doors and frames.
2. Fire-rated wall access doors and frames.
3. Ceiling access doors and frames.
4. Fire-rated ceiling access doors and frames.

B. Locations and Quantities of Access Doors: Not all access doors are shown on the Drawings. It is the intent of this section that access doors be provided wherever access is required for operation and maintenance of concealed equipment, dampers, valves, controls or similar devices.

1. Final locations shall be determined upon coordination of all applicable trades' shop drawing submittals.
2. Coordinate locations with respective trades in field.

C. Cylinders for access doors are specified in Division 8 Section "Door Hardware."

1.2 SUBMITTALS

A. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.

B. Schedule: Provide complete door and frame schedule, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain doors and frames 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 labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for vertical access doors.
2. ASTM E 119 or UL 263 for horizontal access doors and frames.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.4 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: The design for the access doors and frames is based on products as manufactured by Karp Associates, Inc. Subject to compliance with requirements, provide the named products, or approved equivalent products by one of the following:

1. J.L. Industries.
2. Larsen's Manufacturing Co.
3. Milcor, Inc.

2.2 MATERIALS

A. Steel Sheet: ASTM A 366/A 366M commercial-quality, cold-rolled steel sheet with baked-on, rust-inhibitive primer.

B. Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Electrolytic zinc-coated steel sheet with Class C coating and phosphate treatment to prepare surface for painting.

C. Drywall Beads: Edge trim formed from 22 ga., 0.0299-inch (0.76-mm) zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.3 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Shop Primer for Metallic-Coated Steel: Organic zinc-rich primer complying with SSPC-Paint 20 and compatible with topcoat.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.4 ACCESS DOORS AND FRAMES

A. Insulated, Fire-Rated Access Doors for Drywall Walls and Ceilings: Self-latching units consisting of frame with concealed edge trim, door, insulation, and hardware, including automatic closer, interior latch release, and complying with the following requirements:

1. Frame: 16 ga., 0.0598-inch- (1.52-mm-) thick steel sheet, 1-inch (25.4 mm) wide, surrounded by galvanized drywall bead.
2. Door: 20 ga., 0.0359-inch- (0.91-mm-) thick steel sheet, welded pan type, filled

with 2-inch (50 mm) thick fire-rated mineral-fiber insulation.

3. Hinges: Continuous piano type.

4. Latches: Self-latching key-operated bolt type, with interior release; for locking see Fabrication Article below.

5. Fire-Protection Rating for Walls: 1-1/2 hours, unless otherwise indicated.

6. Application: Provide at rated gypsum board walls and ceilings.

7. Available Product: Model KRP-350FR, Insulated Fire Rated Access Door, with Drywall Bead, for Walls and Ceilings, Karp Associates, Inc.

B. Flush Access Doors, with Exposed Trim, for CMU Surfaces: Units consisting of frame with exposed trim, door, hardware, and complying with the following requirements:

1. Frame: 16 ga., 0.0598-inch- (1.52-mm-) thick steel sheet.

2. Trim: Flange integral with frame, 3/4 inch (19 mm) wide, overlapping surrounding finished surface.

3. Door: 14 ga. 0.0747-inch (1.90 mm) thick steel sheet

4. Hinge: Concealed continuous piano type.

5. Latches: Self-latching key-operated bolt type, with interior release; for locking see Fabrication Article below.

6. Application: Provide at non-rated concrete block walls.

7. Available Product: Model DSC-214M, Universal Flush Access Door, Karp Associates, Inc.

C. Trimless, Flush Access Doors for Gypsum Board Surfaces: Units consisting of frame, concealed edge trim, door, hardware, and complying with the following requirements:

1. Frame: 16 ga., 0.0598-inch- (1.52-mm-) thick steel sheet.

2. Door: 14 ga., 0.0747-inch- (1.90-mm-) thick steel sheet.

3. Concealed, Gypsum Board Edge Trim: 0.0299-inch (0.76-mm) zinc-coated or galvanized-steel sheet with face flange formed to receive joint compound.

4. Hinge: Concealed continuous piano type.

5. Latches: Self-latching key-operated bolt type, with interior release; for locking see Fabrication Article below.

6. Application: Provide at non-rated gypsum board walls and ceilings.

7. Available Product: Model KDW, Flush Drywall Access Doors, Karp Associates, Inc.

D. Recessed Doors for Acoustical Ceiling Tiles: Units consisting of frame with no exposed trim, recessed door to receive tile, hardware, and complying with the following requirements:

1. Frame: 14 ga., 0.0747-inch- (1.90-mm-) thick steel sheet.

2. Door: 16 ga., 0.0598-inch- (1.52-mm-) thick steel sheet; recessed 1-inch (25.4 mm).

3. Hinge: Concealed, pivoting-rod type.

4. Latches: Self-latching key-operated bolt type, with interior release; for locking see Fabrication Article below.

5. Application: Provide at non-rated acoustical ceilings tiles.

6. Available Product: Model DSC-210, Recessed Acoustical Ceiling Tile Access Doors, Karp Associates, Inc.

2.5 FABRICATION

A. 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.

B. Steel 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. Exposed Flanges: As indicated.
2. For trimless frames with drywall bead for installation in gypsum board assembly, provide edge trim for gypsum board securely attached to perimeter of frames.
3. For trimless frames with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
4. Provide mounting holes in frames to attach frames to metal or wood framing in plaster and drywall construction and to attach masonry anchors in masonry construction. Furnish adjustable metal masonry anchors.

C. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

D. Locking Devices: Furnish one flush mortised prepped, key-operated cylinder lock without cylinder/core per door. Cylinders for access doors are provided under work of Division 8 Section "Door Hardware."

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 finishes to access 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 PREPARATION

A. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames .

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install access doors, with trimless frames, flush with adjacent finish surfaces or recessed to receive finish material.

3.3 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 083113

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SECTION 087100 Door Hardware

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:
 - a. Swinging doors.
 - b. Sliding doors
 - c. Other doors to the extent indicated.
2. Cylinders for doors specified in other Sections.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 8 Section "Standard Steel Doors and Frames" for factory prefitting and factory premachining of frames for door hardware.
2. Division 8 Section "Flush Wood Doors" for factory prefitting and factory premachining of doors for door hardware.
3. Division 8 Section "Access Doors" for access door hardware, except cylinders.
4. Division 16 Sections for electrical power, wiring and all final connections.

C. Products furnished but not installed under this Section include:

1. Cylinders and cores for locks on access doors.
2. Magnetic door holders.

1.2 SUBMITTALS

A. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements, and roughing-in diagrams for power operators.

B. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, function, size, and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Keying information.
2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other

information essential to the coordinated review of schedule.

3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

C. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Include the following:

- a. System schematic.
- b. Point-to-point wiring diagram.
- c. Riser diagram.
- d. Elevation of each door.

2. Detail interface between electrified door hardware and fire alarm, access control and security system.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

E. Maintenance Data: For power door operators to include in the maintenance manuals specified in Division 1 Section "Closeout Procedures."

F. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Door and hardware Institute, Architectural Hardware Consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation and who shall review the schedule for overall coordination of hardware.

1. Require supplier to meet with Owner to finalize functions of locking devices, keying requirements and to obtain final instructions in writing.
2. Hardware schedule shall be prepared and sealed by AHC.

C. Regulatory Requirements: Comply with provisions of the following:

1. Comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," and ANSI A117.1-1992, as follows:

- a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
- b. Door Closers: Comply with the following maximum opening-force requirements indicated:

- 1) Interior Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
- 2) Fire Doors: Minimum opening force allowable by authorities having

jurisdiction.

c. Thresholds: Not more than ½ inch (13 mm high). Bevel raised thresholds with a slope of not more than 1:2.

2. NFPA 101: Comply with the following for means of egress doors:

a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.

b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.

c. Thresholds: Not more than 1/2 inch (13 mm) high.

D. Fire-Rated Doors and Emergency-Exit Openings: Provide door operators that comply with NFPA 80-1999 requirements for doors as emergency exits and that do not interfere with fire ratings.

E. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80, door assembly listing requirements and the manufacturer's installation instructions, and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

G. UL Standard: Comply with UL 325.

H. Function and Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Incorporate function and keying conference decisions into final hardware and keying schedule after reviewing door hardware functions and keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Address for delivery of keys.

1.4 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.5 PROJECT CONDITIONS

A. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Upon request, check the Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

C. All electrical equipment modifications to fire doors and frames shall be performed in the factory; field modifications are not permitted.

1.6 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 Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of operators and door hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty Period: From date of Substantial Completion, unless otherwise indicated.:

1. Closers: Ten (10) years.
2. Locksets: Three (3) years
3. All other Hardware: Two (2) years.

1.7 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide products and manufacturers as listed in "Door Hardware Sets" included at end of this section.

2.2 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section. Products are identified by using hardware designation numbers of the following:

1. Manufacturer's Product Designations: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated, or equivalent product.

2.3 MATERIALS AND FABRICATION

A. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

B. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

C. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

1. Thru-bolting of hardware will only be permitted where required by NFPA 80, door assembly listing requirements, and the door assembly manufacturer's installation instructions. Fasteners for closer, exit devices and similar hardware that are exposed on opposite face of door from unit will not be permitted.

2.4 SLIDING DOORS TRACKS AND CARRIERS

A. Commercial Grade Type: Medium-duty commercial/residential grade sliding door hardware system. Compact extruded aluminum box track features low friction convex rails for easy rolling. Strong 3-wheel hangers are completely adjustable and feature machine turned ball bearing wheels for smooth operation. Parts are made from 14-16 gauge steel and are zinc dichromate plated for quality appearance. Provide complete set.

1. Type: Plain, with no fascia.
2. Weight of doors: Max 150 lbs.
3. Product: 111SD Series by Johnson Hardware, L.E. Johnson Products, Inc.

2.5 HINGES, BUTTS

A. Templates: Provide only template-produced units for hinges at new frames. Provide units to match existing frame mortises where frame is being re-used.

- B. Screws: Provide Phillips flat-head screws complying with the following requirements:
1. For metal doors and frames install machine screws into drilled and tapped holes.
 2. For wood doors and frames install wood screws.
 3. For fire-rated wood doors install #12 x 1-1/4-inch, threaded-to-the-head steel wood screws.
 4. Finish screw heads to match surface of hinges.
- C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
1. Out-Swing Exterior Doors: Nonremovable pins.
 2. Out-Swing Corridor Doors: Nonremovable pins.
 3. Interior Doors: Nonrising pins.
 4. Tips: Flat button and matching plug, finished to match leaves.

2.6 LOCK CYLINDERS, CORES AND KEYING

- A. Keying System: Coordinate with Owner's requirements.
- B. Equip locks with cylinders for interchangeable-core pin tumbler inserts. Furnish only temporary inserts for the construction period, and remove these when directed.
1. Furnish final cores and keys for installation by Owner.
- C. Metals: Construct lock cylinder and core parts from brass or bronze, stainless steel, or nickel silver.
- D. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
1. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."
 2. Design master key system allowing for 300 percent expansion.
- E. Key Material: Provide keys of nickel silver only.
- F. Key Quantity: Furnish 3 change keys for each lock, 5 master keys for each master system, and 5 grandmaster keys for each grandmaster system.
1. Deliver keys to Owner.

2.7 LOCKS, LATCHES AND BOLTS

- A. Locksets and Latchsets: Extra-heavy-duty lever bored lockset with interchangeable core unless otherwise scheduled. Lockset and cores shall be of the same manufacturer to maintain complete lockset warranty.
- B. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
1. Provide flat lip strikes for locks with 3-piece, antifriction latchbolts as recommended by manufacturer.
 2. Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.

3. Provide dust-proof strikes for foot bolts, except where special threshold construction provides nonrecessed strike for bolt.
4. Provide roller type strikes where recommended by manufacturer of the latch and lock units.

C. Lock Throw: Provide 5/8-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

1. Provide 1/2-inch minimum throw of latch for other bored and preassembled types of locks and 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.

D. Flush Bolt Heads: Minimum of 1/2-inch-diameter rods of brass, bronze, or stainless steel with minimum 12-inch-long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" in height.

2.8 CLOSERS AND DOOR CONTROL DEVICES

A. Size of Units: Except as otherwise specifically indicated, provide non-sized closers for all units.

B. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ADA provisions for door opening force and delayed action closing.

C. Piston: Minimum 1-1/2" diameter one piece steel.

D. Provide all parallel arm closers with one piece forged or 3/8 inch thick stamped solid steel main and one piece forged or 5/16 inch thick stamped solid steel forearm with bronze bushings.

E. Provide all regular arm closers with forged or stamped steel mainarm.

F. Provide heavy-duty steel stud shoulder bolts (including main arm and forearm connection) at all regular arm, hold open arm, built-in stop arm, and hold open / built-in stop closers.

G. Provide exterior closers with all weather hydraulic fluid, suitable from 120°F to -35°F without adjustment.

H. Provide closers with powder coat finish on body, arm and plate adapter, or corrosion inhibitor primer and sprayed finish coat.

I. Provide grey resilient parts for exposed bumpers.

2.9 LOW-ENERGY, POWER-OPEN DOOR OPERATORS

A. Standard: Comply with BHMA A156.19.

B. Performance Requirements:

1. Not more than 15 lbf (67 N applied) 1-inch (25 mm) from latch edge of door to prevent stopped door from opening or closing.
2. If power fails, not more than 30 lbf (133 N applied) 1-inch (25 mm) from latch edge

of door to manually set door in motion.

C. Operation: Power opening and spring closing. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.

1. Control speed of cycle by motor as dynamic brake.

D. Operating System: Electromechanical

E. Microprocessor Control Unit: Solid-state controls.

F. Mounting: Surface.

G. Wall Push-Plate Switch: Manufacturer's standard semiflush, wall-mounted, door control switch; consisting of round or square, flat push plate; of material indicated; and actuator mounted in recessed junction box. Provide engraved message as indicated.

1. Material: Stainless steel.
2. Message: As specified by product number.

H. Products:

1. Door Auto Operator: LCN No. 4640 Auto Equalizer
2. Actuator Touch Pad: LCN Model No. 7910-956
3. Electric Strike: Folger Adams 310 - 2-3/4 or 310-2 as required for bolt length x 24VDC x finish. Fail secure unit.

2.10 DOOR TRIM UNITS

A. Fabricate protection plates the width of single leaf doors less 1-1/2-inches, and width of door leaf less 1" for pairs of doors, to yield a uniform reveal. Provide on push side by height indicated.

1. Metal Plates: Stainless steel , 0.050 inch (U.S. 18 gage).

2.11 SMOKE SEALS

A. General: Provide continuous smoke seals on doors where indicated or scheduled.

B. Automatic Door Bottoms (Drop Seal): Provide fully mortised type with silicon gasket and clear satin anodize finish on metal portions.

C. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled, based on testing according to UL 1784.

D. Fire-Labeled Gasketing: Assemblies complying with NFPA 80-1999 that are listed and labeled, based on testing according to UL 10B or NFPA 252.

2.12 WEATHERSTRIPPING AND SEALS

A. General: Provide continuous weatherstripping on exterior doors and interior doors where indicated or scheduled. Provide noncorrosive fasteners.

B. Weatherstripping at Jambs and Heads: Provide brush type insert and extruded aluminum with anodized finish retainer strips, surface applied, of design and size scheduled.

C. Weatherstripping Sweep: Provide sweep consisting of brush type insert and extruded aluminum with anodized finish housing, surface applied, of design and size scheduled.

2.13 THRESHOLDS

A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.

2.14 HARDWARE FINISHES

A. Provide satin chrome, BHMA 626 (US26D) finish for all hardware items to greatest extent possible or manufacturer's standard finish matching this finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame supports, and other conditions affecting performance of door hardware.

B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.

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

3.2 INSTALLATION

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.

1. All doors with lever trim shall have hardware mounted at heights required by ADA (Americans with Disabilities Act) regulations.
2. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
3. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Pre-drill and countersink doors, frames and units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

- E. Hand tighten screws and fasteners, use of power driven tools must be limited to preliminary driving screws if permitted by door and hardware manufacturer.
- F. Replace doors damaged by improper hardware installation.
- G. Set thresholds for exterior doors in full bed of sealant specified in Division 7 Section "Joint Sealant."
- H. Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.
- I. Install complete automatic door operator system, including activation and safety devices, and remote power units.
1. Low-Energy Power Door Operator Installation Standard: Comply with BHMA A156.19 for installation.
 2. Automatic Door Operators: Install door operator system, including control wiring, as follows:
 - a. Refer to Division 16 Sections for connection to electrical power distribution system. Division 16 Sections shall wire equipment, furnish wiring diagrams to Electrical Contractor.
 3. Activation and Safety Devices: Install devices and wiring, including connections to automatic door operators, according to BHMA A156.10 and as follows:
 - a. Wall Switches: Provide push plates on both sides of each opening indicated to receive automatic door operators.

3.3 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. Adjust door closers in accordance with manufacturer's instructions for proper door closer adjustment for spring power, backcheck, closing and latching speed.
- C. Clean adjacent surfaces soiled by hardware installation.
- D. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
- E. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers of latchsets and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:
1. Examine and re-adjust each item of door hardware as necessary to restore function

- of doors and hardware to comply with specified requirements.
2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
 3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.4 HARDWARE SCHEDULE

A. SCHEDULED HARDWARE SETS

GENERAL NOTES:

1. Doors hardware shall not prohibit exiting from spaces.
2. Provide hardware finishes above unless noted otherwise for a specific set or door.
3. Provide all required installation accessories and options necessary for complete installation of each hardware component, to ensure proper operation of the product.
4. Coordinate all hardware components for each door leaf for overall compatibility.
5. Through-bolting of hardware is not permitted, coordinate all blocking requirements with door manufacturer.
6. Provide all interior doors with wall stops, one per leaf; provide floor type as required when wall stop not feasible. Specific stops scheduled are exceptions to this.
7. Provide thresholds where indicated on drawings.
8. Provide 3 silencers per single door and 2 silencers per pair doors except omit on weatherstripped and smoke and sound sealed doors.
9. Where door closers are scheduled below, provide parallel or standard arm closers placed on the least conspicuous side of the door, unless noted otherwise.
10. Provide cylinders with final cores for access doors as required; coordinate with access door specification section.
11. Provide rain drips at all exterior steel doors not under cover.
12. Provide specified smoke seal at perimeter for all rated openings on corridor walls and at stairwell doors. In addition, provide specified smoke astragal seal at all pairs of doors at rated openings on corridor walls as required by door manufacturer to meet smoke sealing requirement.
13. Functions: The lockset/exit device function specified is for BIDDING ONLY. Review all lock and exit device functions with Owner prior to submission of door schedule.
14. The Door Schedule specifies some products for Aluminum doors in this Section to ensure one manufacturer of exit devices, locksets, and closers throughout the Project. These items must match throughout the building regardless of who supplies them.

See Drawings for Hardware Sets and additional notes and information.

END OF SECTION 087100

SECTION 088000 Glazing

PART 1 - GENERAL

1.1 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. Doors.
2. Interior borrowed lites, sidelights and transoms.
3. Glazed entrances.
4. Frameless mirrors.

1.2 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 Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

E. 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.

F. Deterioration of Mirrors: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning mirrors contrary to mirror manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.3 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: 50 psf.

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 (25 mm), whichever is less.

1) For insulating glass.

2) For laminated glass

3) For monolithic-glass lites heat treated to resist wind loads.

d. Minimum Glass Thickness for Exterior Lites: Not less than 1/4" (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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Thermal and Optical Performance Properties: Provide [non-restoration] 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, unless otherwise indicated.

2. For laminated-glass lites, properties are based on products of construction indicated.

3. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- (13-mm-) wide interspace, unless otherwise indicated.

4. 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 (W/sq. m x K).

5. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.

6. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass and of 12-inch- (300-mm-) long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
1. Fire resistive glass.
 2. Insulating glass for each designation indicated.
 3. For each color (except black) of exposed glazing sealant indicated.
- C. 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.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer
- 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.
- F. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- G. Product Test Reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:
1. Insulating glass.
 2. Coated float glass.
 3. Glazing sealants.
 4. Fire resistive glass.
- H. Warranties: Special warranties specified in this Section.
- I. Mirror Mastic Compatibility Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed

1.5 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: Obtain each type of glass from one primary-glass manufacturer.
- C. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where

solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer

D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.

1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

E. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.

1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

F. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252

G. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
2. Safety glass includes fully tempered glass, laminated mirror glass and laminated glass.

H. Fire-Rated Glass: Permanently mark fire-rated glass with certification label of certification agency acceptable to authorities having jurisdiction indicating manufacturer name, test standard and fire-rating.

I. 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. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."
2. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
3. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

J. 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.
2. Associated Laboratories, Inc.
3. National Accreditation and Management Institute.

K. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1.

1.6 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.

1.7 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. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

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. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those coated-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.

C. 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.

D. Manufacturer's Special Warranty on Laminated Glass: Written warranty, made out to Owner and signed by laminated-glass manufacturer agreeing to furnish replacements for laminated-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: Five years from date of Substantial Completion..

E. Manufacturer's Special Warranty on Fire-Resistive Glazing: Written warranty, made out to Owner and signed by fire-resistive glazing manufacturer agreeing to furnish replacements for fire-resistive glazing 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: Five years from date of Substantial Completion.

F. Manufacturer's Special Warranty on Mirrors: Written warranty, made out to Owner and signed by mirror manufacturer agreeing to furnish replacements for mirrors 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: Five years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 PRIMARY FLOAT GLASS

A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); Class 1 unless otherwise indicated in schedules at the end of Part 3.

2.2 HEAT-TREATED FLOAT GLASS

A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent glass, flat); Quality q3 (glazing select); class, kind, and condition as indicated in schedules at the end of Part 3.

2.3 MIRROR GLASS

A. Clear Glass Mirrors: ASTM C 1503, Mirror Select Quality.

2.4 COATED FLOAT GLASS

A. General: Provide coated glass complying with requirements indicated in this Article and in schedules at the end of Part 3.

1. Provide Kind HS (heat-strengthened) coated float glass in place of coated 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. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, and complying with other requirements specified in schedules at the end of Part 3.

C. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified in schedules at the end of Part 3.

2.5 FIRE RATED GLAZING

A. Fire-Rated Glazing Product (Laminated Ceramic Glazing Material): Proprietary Category II safety glazing product in the form of 2 lites of clear ceramic glazing material

laminated together to produce a laminated lite of 5/16-inch (8-mm) nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft. (19.5 kg/sq. m); and as follows:

1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Polished on both surfaces, transparent.
3. Product: "FireLite Plus" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products

B. Fire-Rated Glazing Product (Laminated Ceramic Glazing Material with Surface-applied Film): Proprietary Category I and II safety glazing product in the form of 2 lites of clear ceramic glazing material laminated together to produce a laminated lite of 3/16-inch nominal thickness with 3M Scotchshield Ultra film applied to both surfaces; polished on both surfaces; weighing 2.4 lb/sq. ft.; and as follows:

1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Polished on both surfaces, transparent.
3. Product: "FireLite NT" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products

2.6 LAMINATED GLASS

A. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, including those in the Laminated-Glass Schedule at the end of Part 3.

B. Interlayer: Interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

1. Interlayer Material: Polyvinyl butyral sheets
2. Interlayer Thickness: .030"
3. Interlayer Color: Clear.

C. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:

1. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

D. Laminated Safety Mirrors: Provide laminated mirrors fabricated to produce units complying with ASTM C 1172, Kind LM, and the following:

1. Glass Lites: Outer lite of mirror glass with silver coating on second surface and inner lite of clear float glass.
2. Interlayer Material: Mirror manufacturer's standard 0.030-inch- (0.76-mm-) thick, polyvinyl-butylal interlayer with a proven record of showing no tendency to delaminate from, or cause damage to, silver coating.
3. Laminating Process: Laminate glass using laminator's standard heat-plus-pressure process to produce glass free from foreign substances, air or glass pockets, and other defects.
4. Seal edges of laminated units to comply with written requirements of interlayer manufacturer.

2.7 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 complying with the following requirements:

1. Aluminum with mill or clear-anodized finish.
2. Desiccant: Molecular sieve or silica gel, or blend of both.
3. Corner Construction: Manufacturer's standard corner construction.

2.8 ELASTOMERIC GLAZING SEALANTS

A. 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.

B. Single-Component Neutral-Curing Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 50; Uses NT, M, G, A, and, as applicable to joint substrates indicated, O.

1. Products:
 - a. Dow Corning Corporation; 791.
 - b. Dow Corning Corporation; 795.
 - c. GE Silicones; SilPruf NB SCS9000.
 - d. GE Silicones; UltraPruf II SCS2900.
 - e. Pecora Corporation; 865.
 - f. Pecora Corporation; 895.
 - g. Pecora Corporation; 898

C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test

assemblies to obtain fire-protection rating.

2.9 GLAZING TAPES

A. 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 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

B. 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:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.10 MISCELLANEOUS GLAZING MATERIALS

A. 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.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

D. 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.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly

H. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

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. Gunther Mirror Mastics.
- b. Palmer Products Corporation.

2.11 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. 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.
- B. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. 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.
- B. 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.
- C. 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.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. 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.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where the length plus width is larger than 50 inches (1270

mm) as follows:

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.
2. Provide 1/8-inch (3-mm) 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.

H. 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.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. 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.

D. 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.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. 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.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. 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.
- C. 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.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. 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.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 INSTALLING MIRRORS

- A. Install mastic as follows:
 - 1. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - 2. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - 3. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface. Corrosion Protection: Coat concealed surfaces of aluminum alloys that will be in contact with grout, concrete, or dissimilar metals, with a heavy coat of bituminous paint.

3.8 PROTECTION AND CLEANING

- A. 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.
- B. 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.

C. 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.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

E. 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.

3.9 GLASS SCHEDULE: GLAZING EXTERIOR PPG SOLAR BAN 70XL OR EQUAL (LOW-E)

A. Doors (minimum):

1. Fire-rated interior doors: Fire resistive glazing type as scheduled.
2. Nonfire-rated interior doors (including interior vestibule door): 1/4 inch clear, fully tempered glass, Kind FT.
3. Exterior Doors: 1 inch insulated glass, as follows:
 - a. Outboard Lite: 1/4 inch thick clear, low-e coated, fully tempered float glass, kind FT.
 - b. Air Space: 1/2 inch.
 - c. Inboard Lite: 1/4 inch thick clear, fully tempered float glass, Kind FT.
 - d. Low-Emissivity Coating: Sputter coated on second surface.
 - 1) Product: Sunguard SuperNeutral-68 by Guardian Industries or equal.
 - e. Performance Characteristics:
 - 1) Visible Light Transmittance: Min 68%.
 - 2) Winter Nighttime U-Value: Max. 0.29.
 - 3) Solar Heat Gain Coefficient (SHGC): Max. 0.37
 - 4) Shading Coefficient: Max. 0.43.
 - 5) Light to Solar Gain (LSG): Min. 1.83.

B. Interior Sidelites, Transoms and Borrowed Lites:

1. Fire-rated openings: Fire resistive glazing type as scheduled
2. Nonfire-rated openings: 1/4 inch clear fully tempered glass, Kind FT.

C. Windows (minimum):

1. Provide 1 inch insulated glass, as follows:
 - a. Outboard Lite: 1/4 inch thick clear, low-e coated float glass.
 - b. Air Space: 1/2 inch.
 - c. Inboard Lite: 1/4 inch thick clear float glass.
 - d. Low-Emissivity Coating: Sputter coated on second surface.
 - 1) Product: Sunguard SuperNeutral-68 by Guardian Industries or equal.
 - e. Performance Characteristics:
 - 1) Visible Light Transmittance: Min 68%.
 - 2) Winter Nighttime U-Value: Max. 0.29.
 - 3) Solar Heat Gain Coefficient (SHGC): Max. 0.37
 - 4) Shading Coefficient: Max. 0.43.
 - 5) Light to Solar Gain (LSG): Min. 1.83.

2. Where "tempered" glass is indicated on drawings, provide 1 inch insulated glass, as follows:
- a. Outboard Lite: 1/4 inch thick clear, low-e coated fully tempered glass, Kind FT.
 - b. Air Space: 1/2 inch.
 - c. Inboard Lite: 1/4 inch thick clear fully tempered glass, Kind FT.
 - d. Low-Emissivity Coating: Sputter coated on second surface.
 - 1) Product: Sunguard SuperNeutral-68 by Guardian Industries or equal.
 - e. Performance Characteristics:
 - 1) Visible Light Transmittance: Min 68%.
 - 2) Winter Nighttime U-Value: Max. 0.29.
 - 3) Solar Heat Gain Coefficient (SHGC): Max. 0.37
 - 4) Shading Coefficient: Max. 0.43.
 - 5) Light to Solar Gain (LSG): Min. 1.83.
3. In addition to the requirements above, provide fully tempered glass (Kind FT) at inboard and outboard lites, at the following locations:
- a. All glazing within 18 inches of the floor or exterior walking surface.
 - b. All glazing adjoining doors.
 - c. All glazing in areas where occupant use may cause physical abuse.
 - d. Community Center Fitness Room Walls: Laminated safety mirrors in sizes as indicated.

END OF SECTION 088000

Architectural Louvers - <http://www.archlouvers.com> - phone: 888-568-8371

SECTION 08 90 00 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fixed, extruded-aluminum wall louvers.

B. See Division 15 Sections for louvers that are a part of mechanical equipment.

1.2 PERFORMANCE REQUIREMENTS

A. Design: Design louvers, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.

B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.

1. Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.

C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.3 SUBMITTALS

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

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

C. Samples: For each type of metal finish required.

- D. Submittal: For louvers indicated to comply with structural performance requirements and design criteria indicated.
- E. Product Test Reports: Based on tests performed according to AMCA 500-L.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.
- B. Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

2.2 FABRICATION, GENERAL

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal High Performance Storm-Resistant Louver <Insert louver type, e.g., **L1**>:
 - 1. Basis-of-Design Product: Architectural Louvers; Model E4WS. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:
 - a. Manufacturers of equivalent products submitted and approved in accordance with Section 01630 - Product Substitution Procedures.
 - 2. Louver Depth: **4 inches (100 mm)**
 - 3. Blade Profile: Drainable blade with front gutter for water diversion to jambs
 - 4. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm) for blades and frames.
 - 5. Louver Performance Ratings:

- a. Free Area: Not less than 8.96 sq. ft. (0.83 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
 - b. Wind-Driven Rain Performance: Not less than 95 percent effectiveness when subjected to a rainfall rate of 3 inches (75 mm) per hour and a wind speed of 29 mph (13 m/s) at a core-area intake velocity of 197 fpm (3.5 m/s).
 - c. Air Performance: Not more than 0.10-inch wg (25-Pa) static pressure drop at 800 fpm (4.1-m/s) free-area velocity.
6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
- B. Louver Screen Frames: Same kind and form of metal as indicated for louver to which screens are attached.
- C. Louver Screening: Same kind of metal as indicated for louver.
 1. Insect Screening: Aluminum, 16 x 18 square mesh, 0.011-inch (0.28-mm) wire.
 2. Bird Screening: Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick.

2.5 ALUMINUM FINISHES

- A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

- D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.
- E. Protect galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

END OF SECTION 08 90 00

SECTION 09211623 – GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Shaft enclosures, Hangar Separation wall, vertical & horizontal room enclosures.
- B. Gypsum drywall construction for applications other than shaft walls is specified in Division 9 Section "Gypsum Drywall Assemblies."
- C. Application and finishing of gypsum wallboard is specified by reference to Division 9 Section "Gypsum Drywall Assemblies."

1.2 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board construction not defined in this Section or in other referenced standards.

1.3 PERFORMANCE REQUIREMENTS

- A. Performance Requirements, General: Provide complete gypsum board shaft wall systems complying with performance requirements indicated on drawings, including fire-resistance ratings and sound attenuation performance.

1.4 SUBMITTALS

- A. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating.
- B. Product data from manufacturers for each type of gypsum board shaft wall system specified.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain components for each gypsum board shaft-wall assembly indicated through one source from a single manufacturer.
- B. Fire-Resistance-Rated Assemblies: Provide gypsum board shaft-wall assemblies as follows:

1. Assemblies comply with requirements of fire-response-tested assemblies indicated by design designations in UL's "Fire Resistance Directory."
2. Fire-resistance ratings were determined by testing assemblies for fire response per ASTM E 119.

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. Neatly stack gypsum boards 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."
- B. Flare out shafts above ceilings as required to accommodate dampers and provide access.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:
 1. G-P Gypsum.
 2. Gold Bond Building Products Div., National Gypsum Co.
 3. United States Gypsum Co.

2.2 ASSEMBLY MATERIALS

- A. General: Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
- B. Steel Framing: ASTM C 645. (Minimum assembly requirements are indicated below. Where larger track sizes or components are indicated in drawings, defer to drawing assembly).
 1. Protective Coating: ASTM A 653, G40 (ASTM A 653M, Z90) hot-dip galvanized coating.

2. Studs: 2-1/2" C-H profile for fire-resistance-rated assembly indicated of minimum 22 gauge.
3. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches (50.8 mm), in depth matching studs and in stud thickness.
4. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches (76.2 mm), in depth matching studs, and not less than 0.0329 inch (0.84 mm) thick.
5. Corner and End Members: Manufacturer's standard profile framing member for use at corners or where assembly terminates at other work, in depth matching studs and in manufacturer's standard thickness not less than the stud thickness indicated.

- C. Gypsum Liner Panels: Manufacturer's proprietary liner panels in 1-inch (25.4-mm) thickness and with moisture-resistant paper faces.
- D. Gypsum Wallboard: ASTM C 36, type X as required by fire-resistance-rated assembly indicated with tapered edge and 1/2" or 5/8" thick to comply with assembly.
- E. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 9 Section "Gypsum Board Assemblies" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- F. Gypsum Wallboard Joint-Treatment Materials: Provide materials complying with ASTM C 475 and gypsum board shaft-wall assembly manufacturer's written recommendations for applications indicated, and as specified in Division 9 Section "Gypsum Board."

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum board shaft-wall construction that comply with requirements indicated and gypsum board shaft-wall assembly manufacturer's written recommendations.
- B. Steel drill screws complying with ASTM C 1002 for fastening gypsum board to steel members less than 0.03 inch (0.76 mm) thick.
- C. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.03 to 0.112 inch (0.76 to 2.84 mm) thick.
- D. Runner (Track) Fasteners: Power-driven fasteners of type indicated below and of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of runners, fasteners, or structural substrates where anchors are embedded.

1. Powder-Actuated Fasteners: Provide powder-actuated fasteners with capability to sustain, without failure, a load equal to 10 times that imposed by shaft-wall assemblies, as determined by testing conducted by a qualified independent testing agency according to ASTM E 1190.
- E. Concealed Acoustical Sealant: As specified in Division 7 Section "Joint Sealers."
- F. 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: As required to comply with fire-resistance-rated assembly indicated.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present. Substrates include hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing; examine for compliance with requirements for installation tolerances and other conditions affecting performance of gypsum board shaftwall assemblies. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fireresistance-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 gypsum wallboard and other panels indicated.
 3. UL Designs indicated on drawings.
- B. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with furring and other support as indicated.
- 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. Coordinate gypsum board shaft-wall construction with sprayed-on fireproofing applied to structural elements so both elements of Work remain complete and undamaged. Patch or replace sprayed-on fireproofing removed or damaged during the installation of shaftwall assemblies to comply with requirements specified in Division 7 Section "Sprayed-on Fireproofing."
- E. At membrane penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, and similar items.
- F. At through-wall penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by firestopping in accordance with Division Section 7 "Firestopping."
- G. Isolate shaft-wall assemblies from building structure to prevent structural movement from transferring loads to shaft-wall assemblies.
- H. 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. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C 919, whichever is more stringent.

3.3 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board shaft-wall assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09211623

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SECTION 092900 – GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Nonload-bearing steel framing members for gypsum board assemblies.
2. Dropped Soffit Installation
3. Gypsum board assemblies attached to steel framing.
4. Tile backer board.
5. Sound-attenuation blankets.

B. Firestopping systems and fire-resistance-rated joint sealants are specified in Division 7 Section "Through Penetration Firestop System s."

C. Acoustical joint sealants are specified in Division 7 Section "Joint Sealants."

D. Gypsum sheathing for screw-attachment to exterior wall steel framing is specified in Division-6 Section "Exterior Sheathing."

E. Thermal insulation is specified in Division 7 Section "Building Insulation."

F. Light gage cold-formed metal framing for exterior walls, "C" shaped steel joists for structural framing and framing for exterior soffits are specified in Division-5 Section "Light Gage Cold-Formed Metal Framing."

1.2 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.

1.3 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

B. Seismic Performance: Provide suspended grid ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. For Seismic Design Category "C" under IBC Building Code comply with the following:
 - a. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580 for Light to Moderate (CISCA Design for Zones 0-2).
 - b. Provide "free floating" ceiling design complying with referenced standard's requirements for perimeter treatment and restraint for hung fixtures in ceiling.

1.4 SUBMITTALS

A. Product Data for each type of product specified.

B. LEED Submittal: - N/A

1.5 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."
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.

1.6 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.

C. Where feasible, gypsum wallboard shall be stored separately from materials which have high short-term emissions. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

D. Where feasible, exposed fiberglass or mineral wool insulations shall not be stored in occupied spaces, near HVAC diffusers (supply or return), or near fresh air intakes.

1.7 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 (4 deg C). For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F (10 deg C) for 48 hours before application and continuously after until dry. Do not exceed 95 deg F (35 deg C) 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.

1.8 SEQUENCING

A. Where feasible, one or both of the following procedures shall be used to minimize the exposure of gypsum wallboard to materials or finishes which have high short-term emissions of VOC's, formaldehyde, particulates, or other air-borne compounds:

1. The gypsum wall board shall be taped, spackled and primed *before* the installation of the highly-emitting materials. OR
2. The gypsum wallboard shall be installed *after* the installation of the highly-emitting materials.

B. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

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. Dale Industries, Inc.
 - b. Dietrich Industries, Inc.
 - c. Marino/Ware (form erly Marino Industries Corp.).
 - d. National Gypsum Co.; Gold Bond Building Products Division.
2. Grid Suspension Assemblies:
 - a. Armstrong World Industries, Inc.
 - b. Chicago Metallic Corp.
 - c. USG Interiors, Inc.
 - d. Worthington Steel Company (formerly National Rolling Mills).
3. Gypsum Board and Related Products:
 - a. LaFarge
 - b. National Gypsum Co.; Gold Bond Building Products Division.
 - c. G-P Gypsum.
 - d. United States Gypsum Co.

2.2 MATERIALS, GENERAL

A. Recycled Content of Products:

1. Steel: Provide products with an average recycled content of steel products so postconsumer recycled content plus preconsumer recycled content is not less than 35 percent.
2. Gypsum Board: Provide products with "synthetic gypsum" produced with a minimum of 75% post-industrial recycled content, if readily available.

2.3 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 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.062 inch (1.6 mm) thick.

C. Wire Hangers: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.162-inch (4.1-mm) diameter.

D. Steel Studs for Furring Channels: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- (5-mm-) wide minimum lip return, and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 22 gage, and as otherwise indicated.
2. Depth: 3-5/8 inches (92.1 mm), and as otherwise indicated.
3. Protective Coating: ASTM A 653, G 40 (ASTM A 653M, Z 90) hot-dip galvanized coating.

E. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth of 7/8 inch (22.2 mm), and minimum thickness of base (uncoated) metal as follows:

1. Thickness: 22 gage, and as otherwise indicated.
2. Protective Coating: ASTM A 653, G 40 (ASTM A 653M, Z 90) hot-dip galvanized coating.

F. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross-furring members that interlock to form a modular supporting network.

1. Basis of Design Product: USG Drywall Suspension System - Flat Ceiling manufactured by US Gypsum Co., or equal.

2.4 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 (ASTM A 653M, Z 90) hot-dip galvanized coating.

B. Steel Studs: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- (5-mm-) wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness: 20 gauge, and as otherwise noted.
2. Depth: 3-5/8 inches, and as otherwise indicated.

C. Deflection Track (Slip Track): Manufacturer's 20 gage top runner complying with the requirements of ASTM C 645 and with 2-inch- (50.8-mm-) deep flanges, slotted clips attached to runner allow studs to move for vertical deflection.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
 - b. Superior Metal Trim; Superior Flex Track System (SFT).

D. Firestop Deflection Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
 - b. Metal-Lite, Inc.; The System

E. Floor and Ceiling (for nesting inside deflection track) Track: Manufacturer's top and bottom runner matching stud gage, complying with the requirements of ASTM C 645 and with 1-1/4-inch- (31.8-mm-) deep flange

F. Steel Rigid Furring Channels: ASTM C 645, hat shaped, depth and minimum thickness of base (uncoated) metal as follows:

1. Thickness: 22 gauge, and as otherwise indicated.
2. Depth: 7/8 inch (22.2 mm).

G. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22.2 mm), minimum bare metal thickness of 0.0179 inch (0.45 mm), and in 2" depth.

1. Protective Coating: ASTM A 653, G 40 (ASTM A 653M, Z 90) hot-dip galvanized coating.

H. 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 (0.84 mm), designed for screw attachment to steel studs and steel rigid furring channels used for furring.

I. Steel Channel Bridging: Cold-rolled steel, 0.0598-inch (1.5-mm) minimum thickness of base (uncoated) metal and 7/16-inch- (11.1-mm-) wide flanges, 1-1/2 inches (38.1 mm) deep, 475 lb/1000 feet (45 kg/100 m), unless otherwise indicated.

J. Steel Flat Strap and Backing Plate: Steel sheet for blocking and bracing complying with ASTM A 653 (ASTM A 653M) or ASTM A 568 (ASTM A 568M), 6 inches wide by length indicated, and with a minimum base metal (uncoated) thickness as follows:

1. Thickness: 0.0359 inch (0.912 mm) where indicated.

K. 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.

2.5 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application. Provide gypsum board in widths of 48 inches (1219 mm).

1. All gypsum board products shall be as per finish schedule and details and moisture/mold resistant in toilet or shower rooms.

B. Gypsum Wallboard: ASTM C 36, tapered edges, Type X for fire-resistance-rated assemblies and Regular elsewhere, in 5/8" thickness unless otherwise indicated.

1. Type: Provide proprietary type as required for specific fire-resistance-rated Assemblies as per details on documents.

C. Moisture/Mold Resistant Gypsum Wallboard: ASTM C36/ASTM C1396 mold resistant type gypsum panels, in 5/8 inch thickness unless otherwise indicated, with tapered edges; panels shall be classified as Type X.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. National Gypsum Company; Type XP/PR.
 - b. United States Gypsum Co.; Mold Tough AR.
 - c. G-P Gypsum; Dens Armor Plus

D. Gypsum Board Base Layer(s) for Multilayer Applications: Same as gypsum wallboard.

E. Abuse Resistant Gypsum Wall Board: ASTM C 36, manufactured to produce greater resistance to surface indentation and through-penetration than standard gypsum panels.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. National Gypsum Company; Gold Bond Hi-Abuse Wallboard.
 - b. United States Gypsum Co.; SHEETROCK Brand Abuse-Resistant Gypsum Panels.
2. Thickness: 5/8 inch (15.9 mm), unless otherwise indicated.
3. Provide fire-resistance rated panels as required.

2.6 TILE BACKING PANELS

A. Fiber-Reinforced Gypsum Interior Panels: ASTM C 1278; panels shall be classified as Type X.

1. Basis of Design Product: Fiberock Aqua-Tough Interior Panels manufactured by USG Corporation or equal.
2. Core: 5/8 inch (15.9 mm), unless otherwise indicated.
3. Application: Tile backer board, at walls with tile wainscotting, in shower alcoves, at ceilings in shower alcoves.

2.7 TRIM ACCESSORIES

A. Accessories: Cornerbead, edge trim, and control joints formed from steel sheet zinc coated by hot-dip process or rolled zinc complying with ASTM C 1047, in shapes indicated

below by reference to Fig. 1 designations in ASTM C 1047.

1. Cornerbead on outside corners, unless otherwise indicated. USG 'Durabead' or equivalent.
2. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated, and where 'Jbead' is referenced. USG No. 200-A, or equivalent.
3. L-bead with face flange only; face flange formed to receive joint compound. Use Lbead where indicated. USG No. 200-B, or equivalent.
4. One-piece control joint formed from rolled zinc with V-shaped slot and removable strip covering slot opening. USG No. 093, or equivalent.

B. Aluminum Accessories: Where indicated, provide manufacturer's standard extruded aluminum

accessories of profile indicated complying with the following requirements:

1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of finish indicated and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 (ASTM B 221M) for alloy and temper 6063-T5.
2. Primed Finish: Manufacturer's standard corrosion-resistant primer compatible with joint compound and finish materials specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering aluminum accessories that may be incorporated in the Work include, but are not limited to, the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. MM Systems, Inc.
 - d. Pittcon Industries, Inc.
4. Basis of Design Products:
 - a. Reveal Molding: Model #DRM-652-75 by Fry Reglet
 - b. Reveal Picture Hanger: Model #DRMH-50 by Fry Reglet.

C. Suspended Grid Ceiling Perimeter Support for Seismic Design in Category "C" Locations: 7/8" USG No. M7 Wall Molding or equal.

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.

B. Joint Tape for Tile Backer Units: As recommended by backer unit manufacturer.

C. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

1. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
2. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.
3. For topping compound, use sandable formulation.

D. 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. All-purpose compound formulated for fill (second) coat.
 - c. Topping compound formulated for finish (third) coats.

E. Joint Compound for Tile Backer Units: Latex fortified mortar (thin set type mortar) for sealing joints.

F. Primer/Surfacer for Level 5 Finish: Sheetrock Tuff-Hide by US Gypsum Co., or equal.

2.9 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: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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 (0.84 mm) thick.

E. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

F. Steel drill screws of size and type recommended by unit manufacturer for fastening tile backer units.

G. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

H. 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). Provide units bearing U.L. classification marking and complying with assembly requirements for rated partitions.

1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.
2. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 35 percent by weight.

I. Suspended Grid Ceiling Accessories for Seismic Design in Category "C" Locations: USG No. SB24 Stabilizer Bars or equal.

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 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. Com ply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

1. Where partition framing and wall furring abut structure, except at floor. Install deflection track top runner to attain lateral support and avoid axial loading.
2. Provide double track system comprised of outside deflection track and inside ceiling runner track at head of studs, nested together, with 1/2" clearance left between the tracks for deflection.

D. 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.

3.3 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. 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. Secure flat, angle, and rod hangers to structure, including intermediate framing

members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.

5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

6. Do not attach hangers to steel deck tabs.

7. Do not attach hangers to steel roof deck. Attach hangers to structural members.

8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Sway-brace suspended steel framing with hangers used for support.

C. 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 (1219 mm) o.c.

2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.

3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

D. 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 (3 mm in 3.6 m) as measured both lengthwise on each member and transversely between parallel members.

E. Wire-tie furring members to main runners and to other structural supports as indicated.

F. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track..

1. For ceilings required to meet seismic design standards in Category "C" locations per IBC Building Code, provide "free floating" ceiling construction as per referenced standards in Part 1, maintaining required grid clearances from wall, independent suspension of fixtures, and other requirements specified; install required wall moldings and stabilizer bars as required.

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 (3 mm) 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. Provide double track system comprised of outside deflection track and inside ceiling runner track at head of studs, nested together, with 1/2" clearance left between the

tracks for deflection. Attach lower (inside) track to studs with framing screws. Similar to U. L. Design HW-S-0005 for rated wall assemblies meeting metal deck/concrete floor assembly or roof deck assembly.

2. For acoustically sealed and 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. Firestop or seal in accordance with Division 7 Sections

D. Install steel studs and furring in sizes and at spacings indicated.

1. Space studs 16 inches (406 mm) o.c., unless otherwise indicated.

E. 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.

F. Frame all door openings to comply with GA-219 for heavy doors, 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 two full height 20 gage studs at each jamb.

G. 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, GA-216, and the Gypsum Association 'Recommended Specification: Levels of Gypsum Board Finish' for wall finish scheduled.

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 (1.5 mm) 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. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches (813 mm) wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

I. 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. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits, conform to clearance requirements of firstopping system or fire dampers at rated wall assemblies.
3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant at non rated walls and 1/4- to 1/2-inch- (6.4- to 12.7-mm-) firstopping system at rated wall assemblies.

J. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) 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.

K. Where acoustically sealed gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

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.
 - a. At stairwells and other high walls, install panels horizontally.

B. Multilayer Application on Ceilings: Apply gypsum board indicated for base layers prior to applying base layers on walls/partitions; apply gypsum wallboard face layers in same sequence. Offset face-layer joints one framing member, 16 inches (400 mm) minimum,

from parallel base-layer joints. Apply base layers at right angles to framing members, unless otherwise indicated.

C. 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.

D. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:

1. Fasten with screws.

E. Multilayer 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 TILE BACKING PANELS

A. Fiber-Reinforced Gypsum Backing Board for Tile: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.

3.8 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.

D. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

1. Install control joints on 30 foot maximum centers, for all partitions, at locations indicated, and as detailed. Align control joints with door frames wherever possible, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
2. Install control joints at 50 foot maximum centers, with areas not to exceed 2,500 sq. ft. for all ceiling areas, at locations indicated, and as detailed.

3.9 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 and to flanges of trim accessories as recommended by trim accessory manufacturer.

D. Levels of Gypsum Board Finish: Provide level of gypsum board finish per GA-214 'Recommended Specification: Levels of Gypsum Board Finish' for wall finish scheduled, and as follows:

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 2 where panels form substrates for tile.
3. Level 4 for gypsum board surfaces, unless otherwise indicated.
4. Level 5 for gypsum board surfaces where specifically indicated on schedules.

E. Use the following joint compound to the finish levels specified, except as noted below:

1. Embedding and First Coat: Ready-mixed, drying-type, taping compound.
2. Fill (Second) Coat: Ready-mixed, drying-type, all-purpose compound.
3. Finish (Third) Coat: Ready-mixed, drying-type, topping compound.

F. Where Level 5 gypsum board finish is indicated, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Apply a single coat of specified primer/surfacer material by spray application in accordance with manufacturer's directions, in lieu of final skim coat of joint compound. Touch up and sand between coats and after last coat of joint compound as needed to produce a surface free of visual defects, tool marks, and ridges and ready for decoration.

1. Provide Level 5 finish at all areas where wall washed lighting is indicated and at surfaces scheduled to receive gloss paint.

G. Provide Level 4 gypsum board finish unless noted otherwise, 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 indicated as "Firetape" provide Level 1 gypsum board finish is indicated, embed tape in joint compound.

J. Finish tile backer boards to comply with unit manufacturer's directions. Pre-fill with holes and joints with latex fortified mortar and immediately embed fiber tape into the mortar and the mortar leveled as flush to the board surface as the tape will allow. Fill all voids and depressions with latex fortified mortar and the feather edges.

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 092900

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093050 TILE SETTING MATERIALS AND ACCESSORIES**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Waterproofing Membrane under entire tile floor in bathrooms & shower room.
- B. Floor drain
- C. Setting materials: adhesives, mortars, grouts, and sealants.

1.2 RELATED SECTIONS

- A. Cast-In-Place Concrete.
- B. Rough Carpentry: plywood subfloor and underlayment.
- C. Joint Sealers.
- D. Gypsum Board: gypsum board and tile backer boards.
- E. Tile and Installation of Tile Setting materials and Accessories.

1.3 REFERENCES

- A. CSA B79-08: Floor, Area, and Shower Drains, and Cleanouts for Residential Construction.
- B. IAPMO IGC 195: Interim Guide Criteria for Floor Drain with Integrated Bonding Flange.
- C. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.
- D. Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.
- E. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

1.4 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. Installation methods.
- C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years' experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.
- C. Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.
- D. 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.
- E. Preinstallation Conference: Conduct conference at the Project site.
 - 1. Convene one week prior to commencing work of this section.
 - 2. Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.
 - 3. Meeting agenda includes but is not limited to:
 - a. Surface preparation.
 - b. Tile and installation material compatibility.
 - c. Edge protection, transition and prefabricated movement joint profiles.
 - d. Waterproofing techniques.
 - e. Crack isolation techniques.

1.6 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.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 COORDINATION

- A. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Laticrete – 9255-0401-2 Quick Cure Hydro Ban Waterproofing Membrane. (1 gallon 50 s.f. – 2 COATS)
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 WATERPROOFING MEMBRANE

- A. Laticrete - Hydro Ban

- 2.3 Description: Laticrete Hydro Ban is a single component self-sealing liquid waterproofing and crack isolation membrane that forms a flexible, seamless and watertight coating once cured. Hydro Ban bonds directly to a wide variety of substrates and can be ready for flood testing in as little as 2 hours in ideal conditions.

2.4 FLOOR DRAIN

- A. See engineering documents and integral shower drain by specified product on documents.

2.5 SETTING Material's

- A. Installation methods as specified in Section 09300 - Tile.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

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.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 093050

SECTION 093100 Ceramic Tile

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Porcelain tile installed over Laticrete Hydro Ban
2. Stone/ Marble thresholds installed over Laticrete Hydro Ban

B. Sealing of expansion, contraction, control, and isolation joints in tile surfaces is specified in Division 7 Section "Joint Sealant."

1.2 SUBMITTALS

A. Product data for each type of product specified.

B. Samples of grout demonstrating full range of colors available, for initial selection purposes.

C. Samples for Verification: Samples of each color of tile, marble threshold, or accessory to be provided, for verification purposes. Where products involve normal color and texture variations, includes sample sets showing the full range of variations expected.

D. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.5 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

C. Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following, or equivalent:

1. Porcelain Tile:

- a. American Olean
- b. Dal-Tile.

2. Mortars and Grouts:

- a. Bostik Construction Products Div. (Hydroment)
- b. Laticrete International Inc.
- c. Mapei Corp.

2.2 PRODUCTS, GENERAL

A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.

1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. Match color, texture, and pattern indicated by reference to manufacturer's standard designations for these characteristics.
2. Provide tile trim and accessories that match color and finish of adjoining flat tile.

D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

2.3 TILE PRODUCTS

A. Porcelain Floor Tile: Provide flat tile complying with the following requirements:

1. Composition: Porcelain.
2. Wearing Surface: As selected by Architect.
3. Colors and Pattern: As selected by Architect.
8. Location: As scheduled on Finish Schedule.

B. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile (unless colors are noted otherwise on Finish Schedule) and to comply with following requirements:

1. Typical Cove Base: Minimum 4" high, matching floor tile.
2. Provide preformed internal and external corners for base tile.

2.4 STONE/MARBLE THRESHOLDS

A. General: Provide stone that is uniform in color and finish, fabricated to sizes and profiles indicated or required to provide transition between tile surfaces and adjoining finished floor surfaces.

1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch (12.7 mm) or less, and finish bevel to match face of threshold.

B. Marble Thresholds: Provide marble thresholds complying with ASTM C 503 requirements for exterior use and for abrasion resistance where exposed to foot traffic, a minimum hardness of 10 per ASTM C 241.

1. Provide marble in color as selected by Architect, with honed finish, complying with MIA Group "A" requirements for soundness.

2.5 SETTING MATERIALS

A. Latex-Portland Cement Mortar: Comply with ANSI A118.4. Provide one of the following, or approved equal:

1. Kerabond with Keralastic; Mapei Corp.
2. Laticrete 4237 with 211 Crete Filler Powder; Laticrete International, Inc.

2.6 GROUTING MATERIALS

A. Latex-Portland Cement Grout for Unglazed Tile: ANSI A118.6, consisting of commercial sanded portland cement grout with latex additive. Provide the following, or equal, in colors as selected by Architect.

1. Laticrete Floor Grout and Joint Filler (Sanded) with Laticrete Grout Admix; Laticrete International, Inc.

B. Latex-Portland Cement Grout for Glazed Tile: ANSI A118.6, consisting of commercial unsanded portland cement grout with latex additive. Provide the following, or equal, in colors as selected by Architect.

1. Laticrete Dry-Set Wall Grout (Unsanded) with Laticrete Grout Admix; Laticrete International, Inc.

2.7 MISCELLANEOUS MATERIALS

A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate unless otherwise indicated.

B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.

C. Grout Release: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Product: Miracle Sealants Inc., "511 Impregnator", or equivalent.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
4. Perform moisture test at rate of one per 2,000 sq.ft.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive tile.

B. Use trowelable leveling and patching compounds per manufacturer's directions to fill cracks, holes, and depressions in substrates and to patch and level floors as required to

provide suitable substrate for tile application.

C. Remove coatings, including curing compounds, and other substances that could interfere with adhesion of tile by using a grinder, sander, or polishing machine with a heavy-duty wire brush.

D. Broom or vacuum clean substrates to be covered by tiles immediately before tile installation. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

E. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.

B. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.

F. Tile Patterns: Comply with pattern indicated on drawings.

G. Expansion Joints: Provide expansion joints, control joints and pressure relieving joints of widths and at locations as per TCA Handbook Construction #EJ171. Do not saw cut joints after installation of tiles.

1. Sealing of joints is included in Division 7 Section "Joint Sealers."

H. Grout tile to comply with ANSI A108.10.

3.4 FLOOR INSTALLATION METHODS

A. Porcelain Tile: Install tile to comply with requirements indicated below for setting bed methods, TCA installation methods related to types of subfloor construction, and grout

types:

1. Concrete Subfloor - TCA F122, and as follows:
 - a. Bond Coat for Tile: Latex-portland cement mortar, ANSI A108.5.
 - b. Grout: Latex-portland cement

B. Joint Widths: Install tile on floors with following joint widths:

1. Porcelain Tile: 1/4 inch, unless otherwise recommended by tile manufacturer.

C. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:

1. Tile floors composed of tiles 8 by 8 inches (203 by 203 mm) or larger.

D. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated. Sealant is specified in Section 07920.

E. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

3.5 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.

1. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION **093100**

SECTION 095113 Acoustical Ceiling Panels

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes ceilings consisting of new/replaced acoustical panels and new/reused and adjusted as required exposed suspension systems as noted on document reflected ceiling plans.
- B. GC is responsible for cutting and installing new panels as noted on drawings and coordination with all ceiling registers, sprinkler heads and misc. existing or new components.

B. Related Sections include the following:

- 1. Acoustical sealants are specified in Division 7 Section "Joint Sealants"

1.2 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 members.
- 2. Method of attaching hangers to building structure.
- 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- 4. Minimum Drawing Scale: 1:100

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on samples of size indicated below.

- 1. 6-inch- (150-mm-) square samples of each acoustical panel type, pattern, and color.
- 2. Set of 12-inch- (300-mm-) long samples of exposed suspension system members, including moldings, for each color and system type required.

D. Product Test Reports: Indicate compliance of acoustical panel ceilings and components with requirements based on comprehensive testing of current products.

E. Research/Evaluation Reports: Evidence of acoustical panel ceiling's and components' compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

G. Maintenance Data: For finishes to include in maintenance manuals.

1.3 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: Obtain each type of acoustical ceiling panel and supporting

suspension system through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency .
 - b. Identify materials with appropriate markings of applicable testing and inspecting agency.
2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
 - a. Smoke-Developed Index: 450 or less

D. Seismic Performance: Provide suspended acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. For Seismic Design Category "C" under IBC Building Code comply with the following:
 - a. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580 for Light to Moderate (CISCA Design for Zones 0-2).
 - b. Provide "free floating" ceiling design complying with referenced standard's requirements for perimeter treatment and restraint for hung fixtures in ceiling.

1.4 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.

1.5 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.

1.6 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.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Recycled Content of Products:

1. Steel: Provide products with an average recycled content of steel products so postconsumer recycled content plus preconsumer recycled content is not less than 25 percent.
2. Mineral Fiber Acoustical Ceiling Panels: Minimum Recycled content (RC) by weight of 25%.

2.2 ACOUSTICAL PANELS

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.
2. Provide fire-resistance rated panels where indicated.
3. See plans for finish schedule.

2.3 ACOUSTICAL SEALANT

A. Refer to Division 7 Section "Joint Sealants".

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.

B. 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 ASTM C 636.
2. For ceilings required to meet seismic design standards in Category "C" locations per IBC Building Code, provide "free floating" ceiling construction as per referenced standards in Part 1, maintaining required grid clearances from wall, independent suspension of fixtures, and other requirements specified; install required wall moldings and stabilizer bars as required.
3. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. 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 attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) 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. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m). Miter corners accurately and connect securely.
3. 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 indicated on reflected ceiling plans.

2. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

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

END OF SECTION **095113**

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SECTION 096500 - RESILIENT FLOORING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. LVT
2. Rubber wall base.
3. Resilient flooring accessories.
4. Rubber Flooring

1.2 SUBMITTALS

A. Product data for each type of product specified.

1. Certification by adhesive manufacturer that products supplied for flooring installation comply with local regulations controlling use of volatile organic compounds (VOC's).

B. Not Used

C. Samples for verification purposes in form of actual flooring or sections of accessories for each color and pattern specified.

1. For heat-welding bead, manufacturer's standard-size samples, but not less than 9 inches (230 mm) long, of each color specified.

D. Shop Drawings: Indicate decorative pattern layout, if any. Show location of seams and edges. Indicate location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutout locations.

E. Maintenance data for resilient flooring and accessories.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an installer who is competent in the technique required by sheet flooring manufacturer for heat-welding seams.

B. Single-Source Responsibility for Floor Tile and Accessories: Obtain each type, color, and pattern of tile and accessory from a single source; all stair accessories shall be from one manufacturer.

C. Single-Source Responsibility for Sheet Flooring and Accessories: Obtain each type, color, and pattern of sheet floor covering specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

D. Fire Performance Characteristics: Provide resilient flooring with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
2. Smoke Density: Less than 450 per ASTM E 662.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient materials on flat surface in dry space protected from the weather with ambient temperatures maintained between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Move floor coverings and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer.

1.5 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive resilient flooring for at least 72 hours prior to installation, during installation, and for not less than 72 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).

B. Do not install flooring if subfloor moisture emission rate exceeds indicated amounts when tested by calcium chloride moisture test, with subfloor temperatures not less than 55 deg F.

1. Linoleum: Not more than 5 lb/1000 sq. ft./24 hours.
2. Non-PVC sheet: as per manufacturer's directions.

C. Do not install flooring or accessories until they are at the same temperature as the space where they are to be installed.

D. Close spaces to traffic during flooring installation.

1.6 SEQUENCING AND SCHEDULING

A. Install flooring and accessories after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Extra Materials: Furnished from same production run as resilient base and accessories installed. Furnish 2 boxes of each type and color of material provided in the work. Package materials with protective covering and identify with labels describing contents. Deliver extra materials to Owner.

1. Extra materials of sheet floor covering is not required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

See Finish Schedule

2.2 PRODUCTS, GENERAL

A. Colors, Textures, and Patterns: Provide tile, sheet goods and accessories in color, texture and pattern to match specified products. Colors and patterns indicated by reference to manufacturer's name and designations are for color and pattern identification only and are not intended to limit selection of other manufacturer's products with similar colors and patterns. If no colors or patterns are indicated, provide color(s) and pattern(s) as selected by Architect from manufacturer's standards.

B. Recycled Content of Rubber Flooring Products: Provide products with an average recycled content of rubber products so postconsumer recycled content plus postindustrial recycled content is not less than 50 percent.

2.4 INSTALLATION ACCESSORIES

A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

B. Concrete Sealer: Type recommended and approved by resilient flooring manufacturer and adhesive manufacturer to ensure proper adhesion of resilient flooring to substrate.

C. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

D. Adhesives (Cements): Products supplied by resilient flooring and accessory manufacturers, of type recommended to suit resilient products and substrate conditions indicated.

1. Use adhesives that have a VOC content of not more than the following when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

a. Linoleum, Wall Base, Accessories: 50 g/L

E. Heat-Welding Bead: Solid-strand product of floor covering manufacturer for heat-welding seams.

1. Color and Pattern: Match color and pattern of sheet floor covering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Examine areas where installation of flooring will occur, with Installer present, to verify that substrates and conditions are satisfactory for flooring installation and comply with flooring manufacturer's requirements and those specified in this Section.

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 whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond tests recommended by flooring manufacturer.

2. Finishes of subfloors comply with tolerances and other 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 of any kind.

C. Concrete Moisture Emission Tests: Perform calcium chloride test as per manufacturer's directions, as follows, and other tests if recommended by resilient flooring and adhesive manufacturer:

1. Perform moisture test at rate of one per 2,000 sq.ft. of new and existing floor area to be covered.
 2. Report test results in writing to Architect, and Contractor within 24 hours after tests are completed. Reports of concrete moisture emission tests shall contain the Project identification name and number, date of test location of test within structure.
 3. Perform additional moisture emission tests of in-place concrete when test results indicate specified moisture content has been exceeded, as directed by Architect.
 - a. Repeat test one week after initial test minimally and additionally repeat test if required by field conditions to determine moisture levels in area of resilient flooring application.

D. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive flooring.

B. Use trowelable leveling and patching compounds per flooring manufacturer's directions to fill cracks, holes, and depressions in substrates and to patch and level floors as required to provide suitable substrate for flooring application.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives by using a grinder, sander, or polishing machine with a heavy-duty wire brush.

D. Broom or vacuum clean substrates to be covered by flooring immediately before installation of flooring. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

F. Seal concrete substrates as required by moisture test results to ensure proper adhesion of resilient flooring to substrate.

3.3 INSTALLATION OF WALL BASE AND ACCESSORIES

A. General: Install resilient accessories according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, pilasters, casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

1. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
2. Install preformed corners as per manufacturer's directions.

C. Place resilient accessories so they are butted to adjacent materials of type indicated and bond to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

3.4 INSTALLATION OF RESILIENT STAIR TREADS/RISERS

A. Apply resilient treads/risers to stairs as indicated and according to manufacturer's written installation instructions.

B. Use stair-tread-nose filler, according to resilient tread manufacturer's written instructions, to fill nosing substrates that do not conform to tread contours.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing installation:

1. Remove visible adhesive and other surface blemishes using cleaner recommended by manufacturers.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by resilient flooring manufacturer.
4. Damp-mop flooring to remove black marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by flooring manufacturer.

1. Cover flooring with undyed, untreated building paper until inspection for Substantial Completion.

C. Clean flooring not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean flooring using method recommended by manufacturer.

END OF SECTION 096500

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SECTION 096513 – RESILIENT BASE AND ACCESSORIES**PART 1 - GENERAL****1.1 SUMMARY**

A. This Section includes the following:

1. Millwork Resilient Rubber Wall Base
2. Resilient Rubber Wall Base

1.2 SUBMITTALS

A. Submittals: Each Product type and location for approval.

1.3 QUALITY ASSURANCE

A. As established by specified manufacturer Johnsonite, Inc. or as per finish schedule.

PART 2 – PRODUCTS**2.1 MANUFACTURERS**

A. Manufacturers: Subject to compliance with requirements, provide products by the Following:

Johnsonite, Inc.

2.2 PROPRIETARY PRODUCT DESCRIPTION

- A. Johnsonite Millwork Resilient Wall Base is manufactured from a proprietary thermoplastic rubber formulation designed specifically to meet the performance and dimensional requirements of ASTM F-1861 Standard Specification for Resilient Wall Base, Type TP, and Group 1.
- B. Construction: Johnsonite Rubber Wall Base is manufactured from a proprietary thermoplastic rubber formulation designed specifically to meet the performance and dimensional requirements of ASTM F-1861, Type TP, Group 1 (solid) Standard Specification for Resilient Wall Base. Johnsonite Vinyl Wall Base is formulated from a homogeneous polyvinyl chloride (PVC) composition combined with high quality additives and colorants designed specifically to meet the performance and dimensional requirements of ASTM F-1861, Type TV, Group 1 (solid) Standard Specification for Resilient Wall Base.

2.3 PHYSICAL CHARACTERISTICS

A. Millwork Resilient Wall Base

1. See finish schedule.
- B. Resilient Rubber and Vinyl Wall Base
 1. Perceptions™ Rubber Wall Base
 - a. Straight (Toeless) and Angled (Toe) Profiles
 - b. 4-1/4" (10.8 cm) height

2.4 PRODUCT PERFORMANCE AND TECHNICAL DATA

- A. Hardness: ASTM D 2240: 85 Shore A;
- B. Flexibility: Will not crack, break or show any signs of fatigue when bent around a 1/4" (6.4 mm) diameter cylinder.
- C. Fire Resistance
 1. ASTM E 648/NFPA 253 (Critical Radiant Flux) – Class 1
 2. ASTM E 84/NFPA 255: Flame/Smoke – Class A / less than 450 Smoke
- D. Chemical Resistance: ASTM F 925, Passed – 5% Acetic acid, 70% Isopropyl alcohol, White mineral oil (medicinal grade), Sodium hydroxide solution (5% NaOH), Hydrochloric acid solution (5% HCl), Sulfuric acid solution (5% H₂SO₄), Household ammonia solution (5% NH₄OH), Household bleach (5.25% NaOCl), Olive oil (light), Kerosene (K1), and Unleaded gasoline (regular grade)
- E. Meets or exceeds the performance requirements for resistance to heat/light aging, chemicals, and dimensional stability when tested to the methods, as described, in ASTM F-1861 Standard Specification for Resilient Wall Base.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The installation of Johnsonite Millwork Resilient Wall Base should not begin until the work of all other trades has been completed, especially overhead trades. Areas to receive wall base shall be clean, fully enclosed, weathertight, and maintained at a uniform temperature of at least 650 F for 24 hours before, during, and after the installation is completed. The wall base and adhesives shall be conditioned in the same manner. Coiled wall base shall be uncoiled and lay flat for at least 24 hours at 650 F prior to installation. Floors and walls shall be clean, dry, free of dust, all paints, wallpaper, and all other foreign material, which may affect proper adhesive bonding. Wall Base may be installed on interior plaster, gypsum wallboard, concrete, masonry, mineral-reinforced cement board or similar porous surfaces. Wall Base shall not be installed on surfaces that will be exposed to drastic temperature changes or moisture. Cut the wall base to finished length and miter cut the ends for inside and outside corners.

3.2 ADHESIVES

- A. Porous Surfaces

1. Millwork Resilient Wall Base profiles: Johnsonite #960 Acrylic Cove Base Adhesive
Application: 1/8" square notch trowel
Coverage: MW-XX-F (Reveal) = 235 to 280
MW-XX-F6 (Reveal) = 170 to 200
MW-XX-H25 (Mandalay) = 400 to 480
2. Resilient Rubber and Vinyl Wall Base: Johnsonite #960 Cove Base Adhesive
Application: 1/8" square notch trowel
Coverage: approximately 250 linear feet of 4" Wall Base

B. Non-porous Surfaces

1. Johnsonite #945 Contact Bond Adhesive
Application: Brush or roller
Coverage: approximately 360 sq ft / gallon

3.3 INSTALLATION

- A. Refer to Johnsonite Millwork Resilient Wall Base Installation Instructions for complete installation details.
- B. Refer to Johnsonite Wall Base Installation Instructions for complete installation details.

END OF SECTION 096513

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SECTION 099000 Painting

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior and exterior substrates:

1. Gypsum board.
2. Wood
3. Metal Door Frames

B. Related Sections include the following:

1. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.

1.2 SUBMITTALS

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

1. Include manufacturers' product data for paints, including printed statement of VOC content and chemical components, include summary with the number of gallon of each type of paint and actual VOC for use in establishing a VOC budget and actual VOC.

B. LEED Submittal: - N/A

D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards: Maintain copy of this standard at the Project site at all times.

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. ICI Paints.
3. M.A.B. Paints.
4. PPG Architectural Finishes, Inc.
5. Sherwin-Williams Company (The).
6. Matthews Paint

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the OTC (Ozone Transport Commission) restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Floor Coatings: VOC not more than 100 g/L.
5. Shellacs, Clear: VOC not more than 730 g/L.
6. Shellacs, Pigmented: VOC not more than 550 g/L.
7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
10. Floor Coatings: VOC not more than 100 g/L.
11. Shellacs, Clear: VOC not more than 730 g/L.
12. Shellacs, Pigmented: VOC not more than 550 g/L.
13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.

- t. Methyl isobutyl ketone.
- u. Methylene chloride.
- v. Naphthalene.
- w. Toluene (methylbenzene).
- x. 1,1,1-trichloroethane.
- y. Vinyl chloride.

D. Colors: As selected by Architect from manufacturer's full range see finish schedule.

E. Paint Strippers: Strip and remove paint from existing surfaces where indicated on Drawings using paint removers specifically designed for removing paint from substrates indicated, and approved by Architect for use on each substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry: 12 percent.
3. Gypsum Board: 12 percent.
4. Wood: 15 percent

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated. See finish schedule.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth and walls are primed.

I. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Application Procedures: Apply paints and coatings by brush or roller according to the manufacturer's directions, except as noted below. Spray application is not permitted for trim, ceilings and walls, unless specifically approved by Architect in advance for each individual situation. Roller application on woodwork is not permitted.

1. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
2. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
3. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

C. 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.

D. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

E. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

F. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

G. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. All items indicated in Hangar Bay.
2. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Tanks that do not have factory-applied final finishes.
 - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
3. Electrical Work:
 - a. Switchgear.
 - b. Panelboards.
 - c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. See engineering documents or N/A.

3.7 INTERIOR PAINTING SCHEDULE

- A. Conventional Gypsum Board Ceilings: Flat acrylic finish - MPI INT 9.2M.
 - 1. Prime Coat: Latex-based, interior primer; Institutional Low Odor/VOC Interior Latex Primer Sealer, MPI #149; VOC Content Range - E3; Environmental Performance Rating -EPR 3.
 - a. Benjamin Moore; Pristine Eco Spec Interior Latex Primer Sealer No. 231.
 - b. ICI Dulux Paints; LifeMaster 2000 Interior Latex Wall Primer LM 9116.
 - c. Sherwin-Williams; Harmony Interior Latex Primer B11W900.
 - 2. Intermediate Coat and Topcoat: Factory-formulated flat acrylic latex paint for interior application; Institutional Low-Odor/VOC Latex (Flat), MPI #143 (Gloss Level 1); VOC Content - E3; Environmental Performance Rating -EPR 4.
 - a. Benjamin Moore; Pristine Eco Spec Interior Latex Flat No. 219.
 - b. ICI Dulux Paints; LifeMaster 2000 Interior Flat, LM 9100.
 - c. Sherwin-Williams; Harmony Interior Latex B5 Series.
- B. Gypsum Drywall Walls: Low-luster (eggshell), acrylic finish - MPI INT 9.2M.
 - 1. Prime Coat: Latex-based, interior primer; Institutional Low Odor/VOC Interior Latex Primer Sealer, MPI #149; VOC Content - E3; Environmental Performance Rating -EPR 3.
 - a. Benjamin Moore; Pristine Eco Spec Interior Latex Primer Sealer No. 231.
 - b. ICI Dulux Paints; LifeMaster 2000 Interior Latex Wall Primer LM 9116.
 - c. Sherwin-Williams; Harmony Interior Latex Primer B11W900.
 - 2. Intermediate Coat and Topcoat: Low-luster (eggshell or satin), acrylic-latex, interior enamel; Institutional Low-Odor/VOC Latex (Low Sheen), MPI #144 (Gloss Level 2); VOC Content - E3; Environmental Performance Rating -EPR 4.5
 - a. Benjamin Moore; Pristine Eco Spec Interior Latex Eggshell Enamel No. 223.
 - b. ICI Dulux Paints; LifeMaster 2000 Interior Eggshell, LM 9300.
 - c. Sherwin-Williams; Harmony Interior Latex Eg-Shel B9 Series.
- C. Gypsum Drywall Walls: Semi-Gloss, waterborne acrylic epoxy finish - similar to MPI INT 9.2F.
 - 1. Prime Coat: Latex or two component epoxy-based, interior primer:

- a. Benjamin Moore; I.M.C. Waterborne Epoxy Primer #M08/M09.
 - b. ICI Dulux Paints; 3210-1200 Ultra-Hide Aquacrylic GRIPPER Stain Killer Primer Sealer
 - c. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series.
2. Intermediate Coat and Topcoat: Two component semi-gloss acrylic epoxy; Interior/Exterior Epoxy (water based), MPI #115; VOC Content - E1, <250 g/L.
- a. Benjamin Moore; I.M.C. Acrylic Epoxy Semi-Gloss #M43/M44.
 - b. ICI Dulux Paints; Tru-Glaze 4418 Waterborne Epoxy Coating.
 - c. Sherwin-Williams; Water Based Catalyzed Epoxy B70/B60V25.
- D. Concrete Masonry: Semigloss, acrylic-enamel finish - MPI INT 4.2A or MPI INT 4.2E
1. Block Filler: Factory-formulated high-performance latex block fillers; MPI #4, VOC E Range of E2 or E3.
 - a. Benjamin Moore; Moorcraft Super Craft Latex Block Filler No. 285.
 - b. ICI Dulux Paints; Bloxfil 4000-1000 Interior/Exterior Heavy Duty Acrylic Block Filler.
 - c. Sherwin-Williams; PrepRite Interior/Exterior Block Filler B25W25.
 2. Intermediate Coat and Topcoat: Semigloss, acrylic-latex, interior enamel; MPI #54 (Gloss Level 5); VOC E Range of E2 (101-150 g/L)
 - a. Benjamin Moore
 - b. ICI Dulux Paints; 1406-XXXX Dulux Professional Acrylic Semi-Gloss Interior Wall & Trim Enamel.
 - c. Sherwin-Williams; ProMar 200 Interior Latex Semi-Gloss Enamel B31W200 Series.
 3. Intermediate Coat and Topcoat: Factory-formulated semigloss acrylic-latex enamel for interior application; Institutional Low-Odor/VOC Latex (Low Sheen), MPI #144 (Gloss Level 2); VOC E Range of E3; Environmental Performance Rating -EPR 5.
 - a. Benjamin Moore; Pristine Eco Spec Interior Latex Semi-Gloss Enamel No. 224.
 - b. ICI Dulux Paints; LifeMaster 2000 Interior Semi-Gloss, LM 9200.
 - c. Sherwin-Williams; Harmony Interior Latex Semi-Gloss B10 Series.
- E. Concrete Floors: Semigloss, waterborne epoxy Polyamide self-priming finish - VOC Range <250; similar to MPI INT 3.2C.
1. Intermediate Coat and Topcoat:
 - a. Benjamin Moore; I.M.C. Acrylic Epoxy Gloss #M43/M44. Applied at a dry film thickness of not less than 1.5 mils (0.038 mm).
 - b. ICI Devoe Paints, Tru-glaze-WBTM 4406, Waterborne Epoxy, Semi-Gloss Coating, 4406-XXXX/4408-9999
 - c. Sherwin-Williams; Armorseal Floor-Plex 7100 B70400/V400
- F. Hollow Metal Doors, Frames, and Sidelights, and Ferrous Metals: Semigloss, acrylic enamel finish - MPI INT 5.1S.
1. Prime Coat: Rust-Inhibitive Primer (Water Based), MPI #107; VOC E Range of E2; Environmental Performance Rating -EPR 2.
 - a. Benjamin Moore; Moore's IMC Acrylic Metal Primer No. M04.
 - b. ICI Dulux Paints; 4020-XXXX Devflex DTM Flat Interior/Exterior Waterborne Primer & Finish
 - c. Sherwin-Williams; Aquaclad Water based Primer, B55-A710 Series.
 2. Intermediate Coat and Topcoat: Factory-formulated semigloss acrylic-latex enamel

for interior application; Institutional Low-Odor/VOC Latex (Low Sheen), MPI #144 (Gloss Level 2); VOC E Range of E3; Environmental Performance Rating -EPR 5.

- a. Benjamin Moore; Pristine Eco Spec Interior Latex Semi-Gloss Enamel No. 224.
- b. ICI Dulux Paints; LifeMaster 2000 Interior Semi-Gloss, LM 9200.
- c. Sherwin-Williams; Harmony Interior Latex Semi-Gloss B10 Series.

G. Woodwork and Hardboard: Semigloss, acrylic-enamel finish, MPI INT 6.3V.

1. Prime Coat: Interior Latex-Based Wood Primer, MI #39; VOC E Range of E3; Environmental Performance Rating -EPR 3.

- a. Benjamin Moore; Pristine Eco Spec Interior Latex Primer Sealer No. 231.
- b. ICI Dulux Paints; Prep & Prime Gripper Multi-purpose Interior/Exterior Water-Based Primer Sealer 3210-1200.
- c. Sherwin-Williams; Harmony Interior Latex Primer B11W900.

2. Intermediate Coat and Topcoat: Factory-formulated semigloss acrylic-latex enamel for interior application; Institutional Low-Odor/VOC Latex (Low Sheen), MPI #144 (Gloss Level 2); VOC E Range of E3; Environmental Performance Rating -EPR 5.

- a. Benjamin Moore; Pristine Eco Spec Interior Latex Semi-Gloss Enamel No. 224.
- b. ICI Dulux Paints; LifeMaster 2000 Interior Semi-Gloss, LM 9200.
- c. Sherwin-Williams; Harmony Interior Latex Semi-Gloss B10 Series.

H. Stained Wood and Woodwork: Waterborne Clear Acrylic Over Stain System, similar to MPI INT 6.3W and INT 6.4U.

1. Wash Coat: Factory-formulated water-based penetrating wood stain for interior application; VOC content <250 g/L.

- a. Minwax Water!Based Pre-satin Wood Conditioner

2. Stain Coat: Factory-formulated water-based penetrating wood stain for interior application; VOC content <250 g/L.

- a. Minwax Water!Based Wood Stain
- b. ICI Dulux Paints; 1802-0000 WoodPride Interior Waterborne Aquacrylic Satin Varnish.
- c. Sherwin-Williams; Wood Classics Waterborne Polyurethane Satin, A68 Series.

3. Two Finish Coats Interior Waterborne Clear Satin Varnish: Factory-formulated clear satin acrylic-based polyurethane varnish applied at spreading rate recommended by manufacturer; Waterborne Clear Acrylic (Semigloss), MPI #129, Gloss Level 5; VOC Content - E Range of E1, Environmental Performance Rating: EPR 1.

- a. Benjamin Moore; Stays Clear Acrylic Polyurethane No. 423, Satin.
- b. ICI Dulux Paints; 1802-0000 WoodPride Interior Waterborne Aquacrylic Satin Varnish.
- c. Sherwin-Williams; Wood Classics Waterborne Polyurethane Satin, A68 Series.

I. Natural-Finish Wood and Woodwork: Waterborne Clear Acrylic System - MPI INT 6.3Q and INT 6.4M.

1. Three Finish Coats Interior Waterborne Clear Satin Varnish: Factory-formulated clear satin acrylic-based polyurethane varnish applied at spreading rate recommended by manufacturer; Waterborne Clear Acrylic (Semigloss), MPI #129, Gloss Level 5; VOC Content - E Range of E1, Environmental Performance Rating:

EPR 1.

a. Benjamin Moore; Stays Clear Acrylic Polyurethane No. 423, Satin.

END OF SECTION **099000**

SECTION 101400 - Signs

PART 1 - GENERAL

1.1 SUMMARY

A. This Section Includes the Following:

1. Panel signs.
2. Dimensional letters and symbols.
3. Signage accessories.
4. Front Elevation - Pin Mounted - Name Signage and Graphic Signage - By Owner.

B. Related Sections Include the Following:

1. Division 1 Section "Temporary Facilities and Controls" for temporary project identification signs.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.

1. Manufacturer's product data for adhesives and sealants, including printed statement of VOC content.

B. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.

1. Provide message list for each sign, including large-scale details of wording, lettering, and braille layout.
2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
3. Templates: Furnish full-size spacing templates for individually mounted dimensional letters and numbers.

C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.

1. Panel Signs: Samples of each finish type and color, on not less than 4-inch squares of plastic material, showing the full range of colors available
2. Dimension Letters:
 - a. Aluminum: Samples of each finish type and color, on 6-inch-long sections of extrusions and not less than 4-inch squares of sheet or plate, showing the full range of colors available.

D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:

1. Panel Signs: Full-size Samples of each type of sign required.
2. Dimensional Letters and Symbols: Provide full-size representative samples of each dimensional letter type and symbol required, showing letter style, color, and material finish and method of attachment

3. Approved samples will be returned for installation into Project.

E. Qualification Data: For Installer.

F. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by signage manufacturer.

B. Source Limitations: Obtain each sign type through one source from a single manufacturer.

C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer

D. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:

a. Room Capacity.

1.4 COORDINATION

A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.

1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

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. Manufacturers of Panel Signs:

a. ASI Sign Systems, Inc.

b. Innerface Architectural Signage, Inc.

c. Modulex.

d. Mohawk Sign Systems.

2. Manufacturers of Dimensional Letters and Symbols:

a. Andco Industries Corp.

b. A.R.K. Ramos Manufacturing Company, Inc.

- c. ASI Sign Systems, Inc.
- d. Gemini, Inc.
- e. Matthews International Corp.
- f. Metal Arts.
- g. Metallic Arts, Inc.
- h. The Southwell Company.
- i. Spanjer Brothers, Inc.
- j. Vomar Products, Inc.

2.2 PANEL SIGNS

A. General: Provide signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1. Produce sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally.
2. Sign materials shall meet a Class A finish.

B. Panel Signs: Sand carved 1/8 inch (3.1 mm) thick melamine plastic. Provide lettering, graphics and background materials in colors as selected by Architect from manufacturer's standard color line.

1. Produce smooth, even, level sign surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.58 mm) measured diagonally.
2. Lettering and Braille Content: Provide uppercase letters raised 1/32 inch (.79 mm), and grade 2 braille for each specific location. Minimum text height: 5/8 inch (15.8 mm).
3. Pictograms: Provide graphics raised 1/32 inch (.79 mm), with minimum 6 inch (152.4 mm) high background field, and lettering and braille written description directly below.
4. Lettering Style: Gill Sans upper case.
5. Copy Location: Centered.
6. Corners and Edges: Radius corners and square edges.
7. Product: Mohawk Frame Series 200A, 'Sand Carved.'
8. Provide specified signage as scheduled.
 - a. Restroom signs shall be style ADA-8 in size 8" x 8".
 - b. Room name and number signs shall be style M-311 in size 6" x 6"
 - c. Exterior handicapped entrance sign shall be style —2-3-9 in size 9" x 9".
 - d. Provide other signs as scheduled.

2.3 PANEL ACCESSORIES

A. Mounting Methods: Use stainless steel exposed fasteners.

2.4 DIMENSIONAL LETTER MATERIALS

A. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by the sign manufacturer for the casting process used and for the use and finish indicated.

B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

C. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.5 DIMENSIONAL LETTERS AND SYMBOLS

A. Cast Letters and Symbols: Form individual letters and symbols by casting. Produce characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into the back of characters and tap to receive threaded mounting studs. Comply with requirements indicated for finish, style, and size.

1. Metal: Aluminum.
2. Letter Height: As indicated on Architect's drawings.
3. Letter Style: As indicated on Architect's drawings.
4. Finish: As indicated on Architect's drawings.

2.6 DIMENSIONAL LETTER FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

1. Refer to Landscape Architect's drawings for finish requirements.

B. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items, including anchor inserts, provided under other sections of Work are sized and located to accommodate signs.

C. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.

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

3.2 INSTALLATION

A. General: Locate interior wall signs and accessories where indicated, in accordance with the ADA, using mounting methods of the type described and in compliance with the

manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
2. Mount signs on wall adjacent to the latch side of door, unless otherwise indicated. Where there is no wall space to the latch side of the door, including at double leaf doors, mount sign on the nearest adjacent wall as approved by the Architect. Mount signs at 48-inches (1219 mm) from the baseline of the lowest characters to the finished floor.
3. Locate signs to allow approach within 3-inches (75 mm) of sign without encountering protruding objects or standing within swing of door.

B. Wall-Mounted Panel Signs: Attach signs to wall surfaces using methods indicated below:

1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

C. Dimensional Letters and Symbols: Mount letters and symbols using standard fastening methods recommended by the manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.

1. Projected Mounting: Mount letters at the projection distance from the surface indicated

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

3.4 INTERIOR SIGN SCHEDULE

3.5 Provide Code fire department signage at each entry door location.
Size and type by code.

END OF SECTION 101400

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SECTION 102113 Urinal / Toilet Compartments

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes solid-plastic polymer resin units as follows:

1. Urinal Screens: Wall hung.
2. Toilet Compartments Wall / Floor Supported

B. Toilet accessories are specified in another Division 10 Section.

1.2 SUBMITTALS

A. Product data for each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

B. Shop drawings for fabrication and erection of toilet compartment assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.

1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

C. Samples for Initial Selection: For each type of unit indicated, demonstrating full range of colors available.

D. Samples for Verification: Of each type of color and finish required for units, prepared on 6-inch- (150-mm-) square samples of same thickness and material indicated for Work

1.3 QUALITY ASSURANCE

A. Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet compartments and related items. Coordinate delivery with other work to avoid delay.

B. Fire-Test-Response Characteristics: Provide toilet compartment materials with surface-burning characteristics as indicated below, as determined by testing identical to those required in this Section, per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify toilet compartments with appropriate markings of applicable testing and inspecting agency.

1. Flame Spread: 200 or less.
2. Smoke Developed: Less than 450, or Smoke Density: less than 75 per ASTM D 2843

C. Flammability of Self-Supporting Plastics: 1.2 inches (30.5-mm) per minute or less per ASTM D 635.

D. Ignition Properties of Plastic: Not less than 650 Deg. F (343.3 Deg. C) per ASTM D 1929.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.5 WARRANTY

A. Warranty shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. Provide a manufacturer's warranty covering the material and workmanship for a period of ten years from the date of final acceptance.

C. Repair or replace any part which becomes defective or breaks during the warranty period.

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. Comtec Industries/Capitol Partitions/Santana Products; Scranton Products
2. Bradley
3. General Partitions Mfg. Corp.
4. Sanymetal; a Crane Plumbing company
5. Santana Products Inc.

2.2 MATERIALS

A. General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.

B. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch (25 mm) thick with seamless construction and eased edges in color and pattern as follows:

1. Colors and Patterns: As selected by Architect from manufacturer's full range of designer colors available.

C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

D. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels

and screens to walls and pilasters of the following material:

1. Material: Clear-anodized aluminum.

E. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:

1. Material: Chrome-plated, nonferrous, cast zinc alloy (zamac) or clear-anodized aluminum, unless noted.

2. Material: Stainless steel where indicated.

F. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile in manufacturer's standard finish.

G. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-polymer components to prevent burning .

H. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.3 FABRICATION

A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.

B. Overhead-Braced Compartments: Provide anodized aluminum angle supports and leveling bolts at pilasters as recommended by manufacturer to suit floor conditions. Make provisions for setting and securing continuous, extruded, aluminum, antigrip, overhead bracing at top of each pilaster. Provide shoe at each pilaster to conceal supports and leveling mechanism.

C. Screens: Attach with anchoring devices as recommended by manufacturer to suit supporting structure. Set units to provide support and to resist lateral impact.

D. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.

1. Hinges: Continuous spring-loaded type fabricated from extruded aluminum with nylon separators at knuckles and stainless pivot pins, that can be adjusted to hold door open at any angle up to 90 degrees. Provide theft proof fasteners concealed under a snap-on cover.

2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.

3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.

4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging

doors or entrance screen doors.

5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.

1. Secure panels to walls and panels with continuous brackets attached to the panel. Locate wall bracket fasteners so holes for wall anchors occur in masonry or tile joints. Secure panels in position with manufacturer's recommended anchoring devices.

B. Overhead-Braced Compartments: Secure pilasters to floor and level, plumb, and tighten installation with devices furnished. Secure overhead brace to each pilaster with not less than two fasteners. Hang doors and adjust so that tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.2 ADJUST AND CLEAN

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors and swing doors in entrance screens to return to fully closed position.

B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 102113

SECTION 102600 Wall and Door Protection

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Corner guards.
2. Impact-resistant wall panels
3. Impact-resistant trim pieces and wall base.

1.2 SUBMITTALS

A. Product Data: Include physical characteristics, such as durability, resistance to fading, and flame resistance, for each wall and door protection system component indicated.

B. Not Used

C. Shop Drawings: Show locations, extent, and installation details of each wall and door protection system component. Show methods of attachment to adjoining construction.

D. Samples for Initial Selection: Manufacturer's color charts consisting of sections of vinyl plastic material showing the full range of colors and textures available for each wall and door protection system component indicated.

E. Samples for Verification: For the following products, showing the full range of color and texture variations expected in each wall and door protection system component. Prepare Samples from the same material to be used for the Work.

1. Wall and Corner Guards: 12-inch- (300-mm-) long Samples of each type of wall and door protection system component required. Include examples of joinery, corners, and field splices.
2. Wall Panels: 6-inch- (150-mm-) square minimum Samples of each type of wall panel system component required. Include examples of joinery, corners, and field splices

F. Maintenance Data: For each wall and door protection system component to include in maintenance manuals specified in Division 1.

1. Include recommended methods and frequency for maintaining optimum condition of vinyl plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to vinyl plastic finishes and performance.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed installation of wall and door protection system components 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. Source Limitations: Obtain each color, grade, finish, and type of wall and door protection

system component from a single source with resources to provide components of consistent quality in appearance and physical properties.

C. Fire-Test-Response Characteristics: Provide wall and door protection system components with the following surface-burning characteristics, as determined by testing materials identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify impact-resistant wall protection system components with appropriate markings of applicable testing and inspecting agency.

1. Flame Spread: 25 or less.
2. Smoke Developed: 450 or less.

D. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store wall and door surface-protection materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within the storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored. Keep sheet material out of direct sunlight to avoid surface distortion.
2. Store rigid plastic corner-guard covers in a vertical position, and rigid plastic wall guard and handrail covers in a horizontal position for a minimum of 72 hours, or until the plastic material attains the minimum room temperature of 70 deg F (21 deg C).

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install wall and door surface-protection system components until the space is enclosed and weatherproof and ambient temperature within the building is maintained at not less than 70 deg F (21 deg C) for not less than 72 hours before beginning installation. Do not install rigid plastic wall surface-protection systems until that temperature has been attained and is stabilized.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wall and Door Protection System Units: Full-size units equal to 2 percent of each type, color, and texture of each type of unit installed, but not less than two units.
 - a. Include accessory components as required. Replacement materials shall be from the same production run as materials installed. Package replacement materials with protective covering, identified with appropriate labels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Low-Emitting Materials: Provide wall panels made with adhesives and composite wood products that do not contain urea formaldehyde.

B. Wall Panel Core: Particleboard: ANSI A208.1, Grade LD-2 made with binder containing no urea-formaldehyde resin, fabricated from 100% recycled, all wood fiber material.

C. Extruded Rigid Plastic: Textured, chemical- and stain-resistant, high-impact-resistant, PVC or acrylic-modified vinyl plastic; thickness as indicated; with a minimum impact resistance of 25.4 ft-lbf/in. (1356 J/m) of width when tested according to ASTM D 256, Test Method A.

1. Color and Texture: As scheduled.

D. Adhesive: Type recommended by the manufacturer for use with material on the substrate indicated.

1. VOC Limits for Installation Adhesives and Glues: Use installation adhesives with max. VOC content of 30g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24)..

2.2 CORNER GUARDS

A. Surface-Mounted, Plastic Corner Guards: Embossed, resilient plastic PVC or acrylic-modified vinyl sheet corner guards; height as indicated. Provide 90-degree turn, unless otherwise indicated; and formed edges.

1. Wing Size Range: 3 by 3 inch minimum, 4 by 4 inch maximum.
2. Mounting Method: Clear self-adhesive, or double-faced, self-adhesive foam tape.
3. Color and Texture: As selected by Architect from manufacturer's full range for these characteristics

2.3 FABRICATION

A. General: Fabricate wall and door protection systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including thicknesses of components.

B. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions in which wall and door protection system components will be installed.

1. Complete finishing operations, including painting, before installing wall and door protection system components.

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

3.2 PREPARATION

A. General: Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Install wall and door protection system components level, plumb, and true to line without distortions.

1. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

3.4 CLEANING

A. General: Immediately on completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

B. Remove excess adhesive using methods and materials recommended by the manufacturer.

END OF SECTION 102600

SECTION 102800 Toilet Accessories

PART 1 - GENERAL

1.1 SUMMARY – See accessory schedule on documents.

A. This Section includes the following:

1. Washroom accessories.
2. Metal framed mirrors.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on Contract Drawings.
2. Identify products using designations indicated on Contract Drawings.

C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals, including replaceable parts and service recommendations.

1.3 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

B. Inserts and Anchorages: Furnish accessory manufacturer's standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.5 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-Of-Design Products: The design for toilet accessories is based on Bobrick Washroom Equipment, unless otherwise indicated. Subject to compliance with requirements, provide the named product or an equivalent product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bradley Corporation.
4. Bobrick

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch (0.8-mm) (22-gage) minimum nominal thickness, unless otherwise indicated.

B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch (0.9-mm) (20-gage) minimum nominal thickness.

C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.

D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.

H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.3 PRODUCTS

A. Refer to schedule on Drawings for products and elevations and details for locations and amount of specific products.

2.4 FABRICATION

A. General: No names or labels are permitted on exposed faces of toilet and bath accessory

units. On either interior surface not exposed to view or on back surface, provide identification of each accessory item either by a printed, waterproof label or a stamped nameplate indicating manufacturer's name and product number

B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.

D. Mirror Unit Hangers: Provide system for mounting mirror units that will permit rigid, tamperproof, and theftproof installation.

E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner's representative.

END OF SECTION 102800

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SECTION 105200 - Fire Protection Specialties

PART 1 - GENERAL

1.1 SUMMARY – Provide allowance for (2) new recessed cabinets and extinguishers in multipurpose room locations to be determined in field.

A. This Section includes the following:

1. Portable fire extinguishers.
2. Fire-protection cabinets for portable fire extinguishers.
3. Fire-protection accessories.

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 roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

C. NYS Fire Code Compliance: Fabricate and label fire extinguishers to comply with New York State Fire Code.

D. Fire Extinguishers: FM listed and labeled for type, rating, and classification specified.

E. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. J.L. Industries, Inc.
2. Kidde: Walter Kidde, The Fire Extinguisher Co.
3. Larsen's Manufacturing Company.
4. Potter-Roemer; Div. of Smith Industries, Inc.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: Carbon steel, complying with ASTM A 366/A 366M, commercial quality, stretcher leveled, temper rolled.

B. Stainless-Steel Sheet: ASTM A 666, Type 304.

2.3 PORTABLE FIRE EXTINGUISHERS

A. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

B. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, in enameled-steel container.

1. Available Product: MP 10, Larsen's Manufacturing Company.

2.4 FIRE-PROTECTION CABINETS

A. Basis-of-Design Product: Occult Series Model SS 2409, as manufactured by Larsen's Manufacturing Co., or an approved equivalent product by one of the following:

1. JL Industries, Inc.
2. Kidde Fyrnetics.
3. Potter Roemer; Div. of Smith Industries, Inc.

B. 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.

1. Fire-Rated Cabinets: Listed and labeled to meet requirements of ASTM E 814 for fire-resistance rating of wall where it is installed.
 - a. 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. Provide factory-drilled mounting holes.

C. Cabinet Size: Suitable for specified fire extinguisher.

D. Cabinet Style: Trimless, with concealed hinge and closed door completely covering cabinet flange.

E. 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.

1. Cabinet Material: Enameled-steel sheet.
2. Recessed Cabinet: Cabinet box fully recessed in walls of depth indicated; with box flange overlapping surrounding wall surface and fully concealed by door when in closed position.

F. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.

1. Door Material: Stainless steel sheet
2. Door Style: Flush, solid panel.
3. Door Hardware: Provide manufacturer's built-in cylinder lock system (*Larsen-Loc™*), or approved equivalent, and 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.

4. Lettering: Provide factory applied lettering that reads "IN CASE OF FIRE ONLY -

PULL FIRMLY ON HANDLE."

2.5 ACCESSORIES

A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked enamel finish. Provide brackets for extinguishers not located in cabinets.

B. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.

1. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."

a. Location: Applied to cabinet door.

b. Application Process: Die cut.

c. Lettering Color and Style: As selected by Architect.

2. Identify bracket-mounted extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to wall surface.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.

D. Steel Finishes: Manufacturer's standard baked-enamel paint in color selected by Architect for the interior of cabinet.

E. Stainless Steel, No. 4 finish for door and frame.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for hose valves, hose racks, and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets are to be installed.

C. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged units.

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing fire-protection specialties.

B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
2. Fasten mounting brackets to structure, square and plumb.
3. Fasten cabinets to structure, square and plumb.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust cabinet doors that do not swing or operate freely.

B. Refinish or replace cabinets and doors damaged during installation.

C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 105200

SECTION 113100 - Residential Appliances

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Refrigerator/freezers w/ ice maker connection.
2. Dishwasher
3. Stove - Gas
4. Hood

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, dimensions of individual appliances, and finishes for each appliance.

B. Appliance Schedule: For appliances; use same designations indicated on Drawings with all accessories and fittings.

C. Maintenance Data: For each product to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Source Limitations: Obtain residential appliances through one source.

1. Provide products from same manufacturer for each type of appliance required.
2. To the greatest extent possible, provide appliances by a single manufacturer for entire Project.

C. Product Options: Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

D. Regulatory Requirements: Comply with provisions of the following product certifications:

1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. UL and NEMA: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.
3. NAECA: Provide residential appliances that comply with NAECA standards

E. Regulatory Requirements, Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with ADA regulations.

1. Operable Parts: Provide controls with forward reach no higher than 48 inches (1219

mm) above the floor, horizontal front reach no more than 25 inches (635 mm), horizontal side reach no more than 24 inches (610 mm), and that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).

2. Refrigerator/Freezer: Provide 50 percent of freezer space within 54 inches (1370 mm) of the floor.

F. AHAM Standards: Provide appliances that comply with the following AHAM standards

1. Household Refrigerators: AHAM HRF-1.

G. Energy Ratings: Provide residential appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the FTC Appliance Labeling Rule.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1.

1.4 WARRANTY

A. Special Extended Warranties: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Refrigerator/Freezer: Five-year limited warranty.

2. Stove: Five-year limited warranty

2. Dishwasher: Five-year limited warranty

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Bosch, Kitcheaid, Zepher or equal.

2.2 APPLIANCES

A. Refrigerator/Freezer: Bosch #B36CT80SNS

B. Dish Washer: Bosch 500 Series #SHXM65Z55N

C. Stove – Gas w/ new Gas line – 36” KitcheAid model #KFGC506JSS

D. Hood – Zepher below cabinet – Model # AK2536BS – 7” hood Duct transition
Connecting to existing exhaust duct system. See engineers documents
For scope of work.

2.3 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Color-Coated and Stainless-Steel Finish: Provide appliances with manufacturer's standard finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, color, gloss, and minimum dry film thickness for painted finishes or ground and polished stainless-steel surfaces for uniform, directionally textured finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.

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

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: Refer to Divisions 15 and 16 for plumbing and electrical requirements.

3.3 CLEANING AND PROTECTION

A. Test each item of residential appliances to verify proper operation. Make necessary adjustments.

B. Verify that accessories required have been furnished and installed.

C. Remove packing material from residential appliances and leave units in clean condition, ready for operation.

END OF SECTION 113100

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SECTION 312316 Excavation and Fill**PART 1 GENERAL****1.1 SUMMARY****A. Section Includes:**

1. Excavating topsoil.
2. Excavating subsoil for buildings, pavements, and landscape.
3. Backfilling building perimeter to subgrade elevations.
4. Backfilling site structures to subgrade elevations.
5. Filling under pavements or slabs-on-grade.
6. Undercutting and filling over-excavation.
7. Disposal of excess material.

B. Related Sections:

1. Section 31 25 13 - Erosion Controls: Controlling sediment and erosion from Work of this section.
2. Section 31 23 17 - Trenching: Excavating and backfilling for utilities.

1.2 REFERENCES**1.3 SUBMITTALS**

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Division 31 - Earthwork

B. Maintain one copy of document on site.

PART 2 PRODUCTS**2.1 MATERIALS**

A. Topsoil: Original surface soil typical of the area which is capable of supporting native plant growth. It shall be free of large stones, roots, waste, debris, contamination, or other unsuitable material which might hinder plant growth.

B. Subsoil: Clean natural soil with a plasticity index of 15 or less that is free of clay, rock, or gravel lumps larger than 2 inches in any dimension, debris, waste, frozen material, and any other deleterious material that might cause settlement. Suitable material excavated from the site may be used as subsoil fill under optimum moisture conditions.

C. Granular Fill: Clean sand, slightly silty sand, or slightly clayey sand having a Unified Soil

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Classification of SW, SP, SP-SM, or SP-SC.

D. Structural Fill: Clean course aggregate Gradation No. 57 conforming to Sections 801 of the SCDOT Standard Specifications.

E. Borrow Material: Conform to subsoil requirements.

2.2 ACCESSORIES

A. Geotextile Fabric: Non-woven, non-biodegradable, conforming to Section 804 of the SCDOT Standard Specifications.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

D. Verify underground structures are anchored to their own foundations to avoid flotation after backfilling.

E. Verify structural ability of unsupported walls to support loads imposed by fill.

3.2 PREPARATION FOR EXCAVATION

A. Call Local Utility Line Information service as indicated on Drawings not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Notify utility company to remove and relocate utilities.

D. Protect utilities indicated to remain from damage.

E. Protect plant life, lawns, rock outcropping, and other features remaining as portion of final landscaping.

F. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, re-landscaped, or regraded without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

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C. Stockpile in area designated on site and protect from erosion.

D. Remove from site excess topsoil not intended for reuse.

3.4 SUBSOIL EXCAVATION

A. Excavate subsoil to accommodate building foundations, structures, slabs-on-grade, paving, landscaping, and construction operations.

B. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity.

C. Slope banks with machine to angle of repose or less until shored.

D. Do not interfere with 45-degree bearing splay of foundations.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Trim excavation. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume. Remove larger material as specified in Section 31 23 18.

H. Notify Engineer and testing agency of unexpected subsurface conditions.

I. Correct areas over excavated with granular fill and compact as required for fill areas.

J. Remove excess and unsuitable material from site.

K. Repair or replace items indicated to remain damaged by excavation.

L. Excavate subsoil from areas to be further excavated, re-landscaped, or regraded.

M. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

N. Remove from site excess subsoil not intended for reuse.

O. Benching Slopes: Horizontally bench existing slopes greater than 3:1 to key placed fill material into slope to provide firm bearing.

P. Stability: Replace damaged or displaced subsoil as specified for fill.

3.5 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures, and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support excavations more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be left in place as part of the completed Work, cut off minimum 18 inches below finished subgrade, or design sheeting and shoring to be removed at completion of excavation work.

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D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water, or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

F. Sheeting, Shoring and Bracing additional notes

General Requirements - At his own expense, the Contractor shall furnish, install and maintain such sheeting, shoring, bracing and cofferdamming, etc., as may be needed to support the sides and roofs of excavations and to prevent any earth or rock movements which might in any way diminish or affect the necessary width of the excavation, endanger the safety of persons, injure or delay the Work, or jeopardize the safety of adjacent pavements, property, buildings or other structures. The work of sheeting, shoring and bracing shall, at all times, be in accordance with the requirements of all Authorities having jurisdiction, including OSHA.

Contractor to be Solely Responsible - The Contractor shall be entirely and solely responsible for the adequacy and sufficiency of all supports and of all sheeting, bracing, shoring, cofferdamming, etc. The Contractor shall assume entire and sole liability for damages on account of injury to persons, adjacent pavements, and public and private property including, but not limited to, the work under construction, buildings and other structures, which injury shall result directly or indirectly from the Contractor's failure to install or to leave in place adequate and sufficient supports, sheeting, bracing, shoring, cofferdamming, etc.

3.6 SURFACE WATER CONTROL

A. Control and remove unanticipated water seepage into excavation.

B. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as specified in Section 31 25 13.

C. Divert surface water and seepage water within excavation areas into sumps or settling basins prior to pumping water into drainage channels and storm drains.

3.7 DEWATERING

A. Design and provide dewatering system to permit Work to be completed on dry and stable subgrade.

B. Operate dewatering system continuously until backfill is minimum 2 feet above normal ground water table elevation.

C. When dewatering system cannot control water within excavation, notify Engineer and stop excavation work.

1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

D. Modify dewatering systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

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E. Discharge ground water and seepage water within excavation areas into sumps or settling basins prior to pumping water into drainage channels and storm drains.

F. Remove dewatering and surface water control systems after dewatering operations are discontinued.

3.8 PROOF ROLLING

A. Proof roll areas to receive fill, pavement and building slabs to identify areas of soft yielding soils.

1. Use loaded tandem-axle pneumatic tired dump truck or large smooth drum roller.
2. Load equipment to maximum 50 tons gross weight and make a minimum of four passes with two passes perpendicular to the others.

B. Undercut such areas to firm soil, backfill with granular fill, and compact to density equal to or greater than requirements for subsequent fill material.

C. Do not proof roll or undercut until soil has been dewatered.

3.9 BACKFILLING

A. Scarify subgrade surface to depth of 4 inches.

B. Compact subgrade to density requirements for subsequent backfill materials.

C. Backfill areas to contours and elevations with unfrozen materials.

D. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

E. Place fill material in continuous layers and compact in accordance with Schedule at end of this Section.

F. Employ placement method that does not disturb or damage other work.

G. Maintain optimum moisture content of backfill materials to attain required compaction density.

H. Support foundation walls and structures prior to backfilling.

I. Backfill simultaneously on each side of unsupported foundation walls and structures until supports are in place.

J. Slope grade away from building minimum 2 percent slope for minimum distance of 10 feet, unless noted otherwise.

K. Make gradual grade changes. Blend slope into level areas.

L. Remove surplus backfill materials from site.

M. Bedding

General Requirements - Bedding in trench for pipe and conduit shall be as shown in detail on the Drawings and as specified herein. Requirements for bedding shall be as follows:

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- (a) Standard Bedding - shall consist of bedding the pipe or conduit on a properly prepared foundation of natural undisturbed earth for trench excavation in cut areas and properly compacted earth for trench excavation in fill areas. The bed shall have recesses to receive the bell of bell and spigot pipe.
- (b) Select Bedding - shall consist of a bed of properly compacted granular bedding material (sand or crushed stone as specified) having a compacted thickness of at least six (6) inches below the bottom of the pipe or conduit and extending around the pipe or conduit for at least 30% of its diameter or rise. Sand shall consist of clean, well graded, hard, durable particles, free of lumps of clay, loam and all other deleterious substances. Crushed stone shall consist of well graded crushed stone conforming to ASTM Designation C-33, Size No. 67. When Select Backfill is specified, the Contractor shall furnish, place and compact all necessary and required select backfill material at no additional cost to the Owner.

Select Bedding shall be used for all polyethylene (HDPE) and polyvinyl chloride (PVC) pipe and conduit installation. Except for HDPE and PVC pipe and conduit installation, and unless otherwise shown on the details of the Drawings, specified or directed by the Owner's Field Representative, Standard Bedding may be used.

3.10 BRIDGING DEGRADED SOILS – Not Used

3.11 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Top Surface of Backfilling Within Building and Paved Areas: Plus or minus 1 inch from required elevations.

C. Top Surface of Backfilling Within Landscape Areas: Plus or minus 2 inches from required elevations.

3.12 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

D. Repair or replace items indicated to remain damaged by excavation or filling.

3.13 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Independent laboratory, field inspecting, testing, adjusting, and balancing.

B. Request visual inspection of bearing surfaces by Engineer and inspection agency before installing subsequent work.

C. Laboratory Material Tests: In accordance with ASTM D1557 or AASHTO T180.

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D. In-Place Compaction Tests: In accordance with the following:

1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
2. Moisture Tests: ASTM D3017.

E. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

F. Frequency of Tests:

1. Building and Pavement Areas: Twice per lift for every 5,000 square feet.
2. Landscape Areas: Twice per lift for every 10,000 square feet.

3.14 SCHEDULES

A. Under Pavement and Slabs:(u.o.n.)

1. Maximum 6-inch compacted depth.
2. Compact material to a minimum of 95 percent of maximum density, except the top 12 inches.
3. Compact top 12 inches to a minimum of 98 percent of maximum density.

B. Under Landscape Areas: :(u.o.n.)

1. Maximum 6-inch compacted depth.
2. Compact to minimum 90 percent of maximum density.

C. Footing Foundation Fill:

1. Structural fill to maximum 12-inch compacted depth.
2. Compact to 98 percent of maximum density.

END OF SECTION 312316

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SECTION 312317 Trenching

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities and utility structures.
2. Bedding.
3. Backfilling and compacting to subgrade elevations.
4. Dewatering.
5. Compacting backfill material.

B. Related Sections:

1. Section 33 23 13 - Erosion Controls: Diversion of water from excavations.
2. Section 31 23 16 - Excavation and Fill: Topsoil and subsoil removal from site surface.
3. Section 31 25 13 – Erosion Controls: Controlling sediment and erosion from
4. Section 33 46 00 - Subdrainage: Building perimeter drainage, filter aggregate, filter fabric, and granular cover.

C. Scope: The Contractor shall provide all labor, plant, material and equipment necessary and required to properly excavate and backfill all utility systems and subsurface structures to be installed under this Contract. Work shall include, but not be limited to, all necessary excavation, including disposal of unsuitable and/or surplus excavated material; all necessary bedding, backfill and compaction, including furnishing approved bedding material and additional suitable backfill material as required; sheeting, shoring and bracing; and dewatering of trenches as necessary and required.

D. General: Trench excavation shall be carried out by the Contractor to conform with the line and grade of the various utilities and the bottom of the foundations and/or footings for subsurface structures as shown on the Drawings and as specified herein. All excavations shall be kept free from water, snow and ice during construction. The Contractor shall be responsible, at all times, for conducting all operations in a safe and prudent manner so that all workmen and the public will be protected from hazard. The Contractor shall observe all applicable Local, County, State and Federal requirements, and he shall obtain all necessary permits and pay all fees, deposits and charges required for acquiring said permits.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
6. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in

Place by Nuclear Methods (Shallow Depth).

C. NYSDOT Standard Specifications

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

B. Utility Structures: Manholes, catch basins, inlets, valve vaults, hand holes, and other utility access structures as indicated on Drawings.

C. Trench Terminology:

1. Foundation: Area under bottom of trench supporting bedding.
2. Bedding: Fill placed under utility pipe.
3. Haunching: Fill placed from bedding to center line of pipe.
4. Initial Backfill: Fill placed from center line to 6 to 12 inches above top of pipe.
5. Final Backfill: Fill placed from initial backfill to subgrade.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of South Carolina.

C. Dewatering Plan if required: Describe methods of dewatering and disposal of water.

D. Product Data: Submit data for geotextile fabric indicating fabric and construction.

E. Samples: Submit to testing laboratory, in air-tight containers, 10-pound sample of each type of fill.

F. Materials Source: Submit name of imported fill material suppliers.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Division 31.

B. Maintain one copy of document on site.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 BACKFILL MATERIALS

A. Subsoil Fill: Clean natural soil with a plasticity index of 15 or less that is free of clay, rock, or gravel lumps larger than 2 inches in any dimension; debris; waste; frozen material; and any other deleterious material that might cause settlement. Suitable material excavated from the site may be used as subsoil fill under optimum moisture conditions.

B. Granular Fill: Clean sand, slightly silty sand, or slightly clayey sand having a Unified Soil Classification of SW, SP, SP-SM or SP-SC.

C. Foundation Stone: Clean course aggregate Gradation No. 57 conforming to Sections 801 of the SCDOT Standard Specifications.

D. Bedding and Haunching Material:

1. Rigid Pipe: Granular Fill.
2. Flexible Pipe: Foundation Stone.

E. Bedding for Structures: Foundation Stone.

F. Initial Backfill to 6 inches Minimum Above Utility:

1. Rigid Pipe: Subsoil Fill.
2. Flexible Pipe: Foundation Stone.

G. Final Backfill to Subgrade:

1. Under Pavement: Granular Fill.
2. Under Landscape: Subsoil Fill.

2.2 ACCESSORIES

A. Geotextile Fabric: Non-woven, non-biodegradable conforming to Section 804 of the SCDOT Standard Specifications.

B. Concrete: Concrete conforming to Section DIVISION 3.

1. Compressive strength of 3,000 psi at 28 days.
2. Air entrained.
3. Water cement ratio of 0.488 with rounded aggregate and 0.532 with angular aggregate.
4. Maximum slump of 3.5 inches for vibrated concrete and 4 inches for non-vibrated concrete.
5. Minimum cement content of 564 lbs per cubic yard for vibrated and 602 lbs. per cubic yard for non-vibrated concrete.

PART 3 EXECUTION

3.1 PREPARATION

A. Call local utility line information service indicated on Drawings not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, rock outcropping, and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

3.2 LINES AND GRADES

A. Excavate to lines and grades indicated on Drawings.

1. Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.3 TRENCHING

A. Excavate subsoil required for utilities.

B. Remove lumped subsoil, boulders, and rock up of 1/3 cubic yard, measured by volume. Remove larger material as specified in Section 31 23 18.

C. Perform excavation within 48 inches of existing utility service in accordance with utility's requirements.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Remove water or materials that interfere with Work.

F. Trench Width: Excavate bottom of trenches maximum 16 inches wider than outside diameter of pipe or as indicated on Drawings.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

H. Maintain vertical faces to an elevation equal to 12 inches above top of pipe.

1. When Project conditions permit, side walls may be sloped or benched above this elevation.
2. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this Section.

I. Support Utilities and Structures:

1. Keep trench width at top of trench to practical minimum to protect adjacent or crossing utility lines
2. Support utilities crossing trench by means acceptable to utility company.
3. Do not interfere with 45-degree bearing splay of foundations.
4. Provide temporary support for structures above and below ground.

J. When subsurface materials at bottom of trench are loose or soft, excavate to firm subgrade or to depth directed by Engineer.

1. Cut out soft areas of subgrade not capable of compaction in place.
2. Backfill with foundation stone and compact to density equal to or greater than requirements for subsequent backfill material.

K. Trim Excavation: Hand trim for bell and spigot pipe joints where required. Remove loose

matter.

L. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

M. Place geotextile fabric over trench foundation stone prior to placing subsequent bedding materials.

N. Trench Excavation

General Requirements - The Contractor shall be responsible for the excavation of all materials encountered, and there will be no extra compensation for any excavation, regardless of the character or type of soils or materials encountered.

Method of Trenching - Trench excavation shall be done with excavating machinery, except in such places where work performed in this manner will injure trees, buildings or existing utilities or structures, or where the use of machinery is specifically forbidden, in which case hand methods shall be employed.

Preparation of Bottom of Trench - The trench bottoms shall be prepared to conform to the details on the Drawings and as specified herein. Special precautions shall be exercised to insure that pipe and conduit, when installed, will not rest on rock, masonry or any other materials which would present a non-uniform foundation. For bell and spigot pipe, bell holes shall be provided at each pipe joint to prevent bearing on the bell of the pipe. Where two or more pipes or conduits are to be laid in the same trench, the Contractor shall excavate the trench so that all pipe and conduit are laid on undisturbed or approved properly compacted material.

Unsuitable Material at Bottom of Trench - When the material at the bottom of a trench is unsuitable, it shall be removed to such depth as the Owner's Field Representative may direct, and backfilled with suitable and properly compacted granular material obtained from the Project excavation, or from borrow excavation if it is not available within the Project. Compaction of this replacement material shall be not less than 95% Maximum Modified Density (ASTM Designation D-1557). Payment for removal of unsuitable material and replacement with suitable compacted granular material, as directed, shall be considered as included under the lump sum Base Bid.

Excavation in Paved Areas - When excavations are to be made in paved surfaces, the paved surfaces shall be line cut on each side of the trench and ahead of the excavation by means of saw cutting or other approved tools to provide a clean, uniform edge, with minimum disturbance of the remaining pavement. The pavement so removed shall not be used for trench backfill, but shall be disposed of as directed by the Owner's Field Representative.

Unsuitable Excavated Material - Unsuitable excavated material shall be disposed of by the Contractor in accordance with the directions of the Owner's Field Representative.

Surplus Excavated Material - Excavated material which is not required for trench backfill shall be disposed of by the Contractor where and as directed by the Owner's Field Representative. In general, suitable surplus excavated material may be used as fill material.

O. Rock Excavation in Trench

General Requirements - If rock is encountered in trench, the Contractor shall excavate, remove and dispose of rock in trench within the limits specified and in accordance with the Drawings and Specifications and/or as approved by the Owner's Field Representative. Rock excavation in trench shall be defined as removal of boulders larger than one (1) cubic yard in volume and removal of ledge rock, concrete or masonry structures which cannot be ripped with a one and one-half (1-1/2) cubic yard backhoe or equivalent and requires drilling, blasting, or other special methods for removal. Removal of concrete pavement over trench is not considered rock excavation in trench. For pipe and conduit installation, rock excavation shall be carried to a level at least six (6) inches below the bottom of the pipe or conduit. The trench shall then be brought to proper grade for laying of the pipe or conduit by the placing of Select Bedding as directed by the Owner's Field Representative.

Shattered Rock - If, in the course of rock excavation, the rock below grade is shattered due to over-drilling or over-blasting, and the Owner's Field Representative considers such shattered rock to be unfit for support of pipe, conduit or structures, the shattered rock shall be removed and the excavation backfilled with concrete, gravel or crushed stone, as the Owner's Field Representative directs. All such removal, backfilling and corrective work shall be done by and at the expense of the Contractor.

Blasting - When drilling and blasting are permitted, the Contractor must employ licensed personnel, and adhere to all Local, County, State and OSHA Regulations regarding the use and storage of explosives, and he shall acquire all necessary insurance, permits and licenses. The Contractor shall be responsible for all damages due either directly or indirectly to such operations. Blasting, when permitted, shall be done only at such times as the Owner and those Authorities having jurisdiction shall approve and under such conditions and restrictions as they may impose.

Payment - No additional payment will be made for rock excavation in trench; compensation shall be considered as included in the lump sum Base Bid.

3.4 SURFACE WATER CONTROL

- A. Control and remove unanticipated water seepage into excavation.
- B. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as specified in Section 31 25 13.
- C. Divert surface water and seepage water within excavation areas into sumps or settling basins prior to pumping water into drainage channels and storm drains.

3.6 DEWATERING

- A. Design and provide dewatering system to permit Work to be completed on dry and stable subgrade.
- B. Operate dewatering system continuously until backfill is minimum 2 feet above normal ground water table elevation.
- C. When dewatering system cannot control water within excavation, notify Engineer and stop excavation work.
 - 1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.

2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

D. Modify dewatering systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

E. Discharge ground water and seepage water within excavation areas through filter bags or into settling basins prior to pumping water into drainage channels and storm drains.

F. Remove dewatering and surface water control systems after dewatering operations are discontinued.

3.5 BEDDING, HAUNCHING, AND INITIAL BACKFILL

A. Place bedding full width of trench to the depth indicated on Drawings and compact to 95 percent maximum density. Excavate for pipe bells.

B. Install utility pipe and conduit in accordance with the respective utility section.

C. Support pipe uniformly along entire length of pipe.

D. Carefully place haunching material to center of pipe, rod and tamp material to fill voids and provide uniform support of pipe haunches. Compact to 90 percent maximum density.

E. Carefully place initial backfill to 6 inches above top of pipe or to depth indicated on Drawings. Compact to 95 percent maximum density.

F. Bedding

General Requirements - Bedding in trench for pipe and conduit shall be as shown in detail on the Drawings and as specified herein. Requirements for bedding shall be as follows:

- (a) Standard Bedding - shall consist of bedding the pipe or conduit on a properly prepared foundation of natural undisturbed earth for trench excavation in cut areas and properly compacted earth for trench excavation in fill areas. The bed shall have recesses to receive the bell of bell and spigot pipe.
- (b) Select Bedding - shall consist of a bed of properly compacted granular bedding material (sand or crushed stone as specified) having a compacted thickness of at least six (6) inches below the bottom of the pipe or conduit and extending around the pipe or conduit for at least 30% of its diameter or rise. Sand shall consist of clean, well graded, hard, durable particles, free of lumps of clay, loam and all other deleterious substances. Crushed stone shall consist of well graded crushed stone conforming to ASTM Designation C-33, Size No. 67. When Select Backfill is specified, the Contractor shall furnish, place and compact all necessary and required select backfill material at no additional cost to the Owner.

Select Bedding shall be used for all polyethylene (HDPE) and polyvinyl chloride (PVC) pipe and conduit installation. Except for HDPE and PVC pipe and conduit installation, and unless

otherwise shown on the details of the Drawings, specified or directed by the Owner's Field Representative, Standard Bedding may be used.

3.6 FINAL BACKFILLING TO SUBGRADE

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place fill material in continuous layers and compact in accordance with schedule at end of this Section.
- D. Employ placement method that does not disturb or damage utilities in trench or foundation perimeter drainage.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Do not leave more than 50 feet of trench open at end of working day.
- G. Protect open trench to prevent danger to the public.

3.7 DISPOSAL OF EXCESS MATERIAL

- A. Dispose of excess material offsite and legally.
- B. Furnish Engineer with certificate of disposal site or agreement from private property owner.

3.8 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling: Plus or minus 1 inch from required elevations.

3.9 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D1557 or AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.
- E. Frequency of Tests: Two tests per lift for every 1000 feet of trench.

3.12 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.10 SCHEDULE OF COMPACTION

A. Under Pavement and Slabs: (u.o.n)

1. Granular Fill in maximum 8-inch loose lifts.
2. Compact to minimum 95 percent maximum density except the top 12 inches.
3. Compact top 12 inches to minimum 98 percent maximum density.

B. Under Landscape Areas: (u.o.n)

1. Subsoil Fill in maximum 8-inch loose lifts.
2. Compact to minimum 90 percent maximum density.

C. In Unstable or Unsuitable Trench Foundation Areas: (u.o.n)

1. Foundation Stone in maximum 12-inch loose lifts.
2. Compact to 98 percent maximum density.

END OF SECTION 312317

SECTION 312500 Temporary Soil, Erosion, Sediment and Dust Control

PART 1 - GENERAL

1.1 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections.

B. Additional information concerning temporary erosion and sedimentation control may be found on the civil drawings and SWPP. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

1.2 SUMMARY

A. Work Included. Furnish, install, maintain, and remove temporary erosion and sedimentation controls as shown on the drawings or specified herein, or as required to complete the work.

B. Related Sections include the following:

1. Division 31 Section "Site Clearing" site stripping, grubbing, stripping [**and stockpiling**] topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 33 Section "Subdrainage " for drainage..
3. Division 31 Section "Earth Moving" for soil materials, site excavating, filling and grading.
4. Division 31 Section "Trenching and Backfilling" for excavating and backfilling of utilities.

C. Permits and Fees: Obtain and pay for all permits and fees required for the work of this section, including erosion and sediment control and water quality permits required by the authority having jurisdiction and the Colorado Department of Public Health and Environment, Water Quality Control Division.

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Unclassified Excavation: Removal of all material of whatever character required for the work encountered above subgrade elevations and to lines and dimensions indicated, including boulders.

C. Fill: Fill is all material placed to raise the grade of the site or to backfill excavation, upon which the Soils Engineer has made sufficient tests and observations to enable him to issue a written statement that, in his opinion, the fill has been placed and compacted in accordance with the requirements of these specifications.

D. BMP: Best Management Practice. Erosion and sediment control devices, which may consist of silt fence, filter fabric, riprap, etc.

E. SWMP: Storm Water Management Plan. Identifies BMPs, which are erosion and sediment control measures for the project.

F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

G. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

H. Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services to buildings.

1.4 SUBMITTALS

A. Submittal Procedures: All submittals are to be made to the Owner's Representative. If provided refer to Division 1 section "Submittal Procedures."

B. Product Data: Submit manufacturer's published descriptive literature and complete specifications for manufactured products specified herein and utilized on the project.

1. Geotextiles.
2. Erosion Control Fabric.

C. Storm Water Management Plan:

1. The Engineer will provide a Storm Water Management Plan (SWMP) and report addressing erosion and sediment control measures for all sites with over one acre of disturbed ground.
2. Contractor shall have the Storm Water Management Plan (SWMP) and report available on-site at all times.

1.5 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with applicable local, State and Federal ordinances, rules and regulations concerning sedimentation control and storm water runoff.

B. In case of conflict between the above codes, regulations, references and standards and these specifications, the more stringent requirements shall govern.

C. Preconstruction Conference: Conduct conference at Project site as directed by Owner's Representative prior to start of construction. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.6 PROJECT/SITE CONDITIONS

A. Existing Conditions: Verify all existing conditions affecting the work of this section prior to submitting bids or proposals. Additional compensation will not be allowed for revisions or modification of work resulting from failure to verify existing conditions.

1.7 WARRANTY

A. Temporary Erosion and Sediment Control measures shall be maintained until permanent measures are in place. All damaged, disturbed or devices filled with sediment, which may occur within the specified project warranty period, shall be corrected at no cost to the Owner. Any devices damaged by erosion or sediment shall be restored to their original condition by the Contractor, at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Erosion and Sedimentation Control Materials: Provide one or more of the following materials, as shown on the plans or as applicable for site conditions:

1. Sand bags.
2. Silt fences.
3. Rock riprap.
4. Temporary seeding.
5. Drainage geotextile.
6. Impervious fill.
7. Other materials proposed for use on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. General:

1. Determine the existing ground elevations, drainage patterns, and changes to such patterns during excavation in order to satisfactorily plan and provide materials for adequate erosion and sediment control devices.

3.2 TEMPORARY EROSION, SEDIMENTATION AND DUST CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and rights-of-way according to requirements of authorities having jurisdiction.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

D. Throughout all operations covered by this contract, the contractor shall provide all necessary measures to control dust through the use of water only. The project is in a watershed area and no chemicals are allowed to be used.

3.3 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work of this section will be performed. Do not proceed with the work until unsatisfactory conditions have been corrected. Commencement of work implies acceptance of all areas and conditions.

3.4 INSTALLATION

A. Erosion and Sedimentation Control Devices. Erosion and sedimentation control measures to be taken during construction include, but are not necessarily limited to the following:

1. Apply soil stabilization within 14 days to all disturbed areas that are to be dormant for a period longer than 30 calendar days after reaching grade. Stabilize soil with mulch anchored per criteria of authorities having jurisdiction.
2. Roads and parking areas indicated to be paved may be covered with an appropriate aggregate base course in lieu of mulch. Temporary mulching or aggregate base course is not required if final pavement construction will take place within 30 days after grading to final contours.
3. Soils that will be stockpiled for more than 30 days must be mulched and seeded within 14 days after stockpile construction.
4. Prevent sediment from leaving the project site by installing a silt fence or other BMPs as indicated on the plans. Protect existing storm inlets adjacent to the site by an approved gravel filter.
5. Excavate the future detention/water quality pond and construct the outlet structure/storm sewer such that the pond may function as a temporary sediment basin during development of the site. Construct the sediment basin in accordance with authority having jurisdiction's criteria. Provide temporary swales to convey site runoff to the pond.
6. Locate stone stabilization pads at all points of vehicular ingress and egress to the construction site.
7. Provide temporary erosion controls consisting of berms at the top of slopes and interceptor ditches at ends of berms and at those locations which will eliminate or minimize erosion during construction, along with temporary seeding, temporary diversion, chutes, and down pipes and lining of water courses.
8. Temporary sedimentation controls shall consist of silt dams, traps, silt fence, barriers, and appurtenances at the top of spoil and borrow area slopes and where runoff water exits the site.
9. Maintain the available silt holding capacity of silt dams, fence traps and barriers until no longer needed. The sediment capacity of sediment retainage areas shall be at a minimum, the capacity shown on the plans in conformance with Urban Drainage Criteria Manual, Volume 3. Prior to removal, obtain concurrence of the Owner and Engineer.
10. Remove accumulated sediment and debris from a BMP when the sediment level reaches one-half the height of the BMP, or at any time the sediment or debris adversely impacts the functioning of the BMP.
11. The erosion/sediment control plan shows the minimum required for the project. If it becomes apparent that additional controls are necessary, the Engineer shall be notified and with approval of the Owner's Representative additional controls shall be installed.

B. Chemicals and Pollutants:

1. Store construction materials and chemicals that could contribute pollutants to the runoff within an enclosure, container, or dike located around the perimeter of the storage area, to prevent discharge of these materials into runoff from the construction site.
2. Locate areas used for collection and temporary storage of solid and liquid waste away from the storm drainage system. Provide covering or fencing as required to prevent windblown materials; construct perimeter dike to contain liquid runoff. These measures may not be necessary if materials are immediately placed in covered waste containers.
3. Perform equipment maintenance in designated areas using measures such as drip pans to control petroleum products spillage.
4. Immediately clean up and properly dispose of spills of construction related materials such

as paints, solvents, or other chemicals.

C. Inspection and Maintenance: Inspect erosion and sediment control measures weekly during construction. In addition, inspect all facilities immediately after any significant runoff or snowmelt which results in runoff. Repair or otherwise mitigate any damage to the erosion and sediment control facilities at no additional cost to the Owner.

3.5 CLEANING

A. Removal of Controls: Remove controls upon completion of that portion of the work for which controls were furnished. Leave the site and work area in a clean condition.

END OF SECTION 312500

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SECTION 312513 EROSION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes installing, maintaining and removing:

1. Silt Fence.
2. Site Stabilization

B. Related Sections:

1. Section 31 23 16 - Excavation and Fill.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-pound) rammer and a 457-mm (18-inch) drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on geotextile, posts, woven wire, concrete mix design, and pipe.

C. Manufacturer's Certificate: Certify products and aggregates meet or exceed specified requirements.

D. Closeout Submittals: Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

1.4 QUALITY ASSURANCE

1.5 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this Section.

PART 2 PRODUCTS

2.1 GEOTEXTILE MATERIALS

A. Engineering Fabric Materials: Non-biodegradable

1. Silt Fence: Type 3, Class A or B Engineering Fabric.
2. Under Rip Rap or Construction Entrances: Type 2 Engineering Fabric.

2.2

2.7 SOURCE QUALITY CONTROL (AND TESTS)

A. Section 01 40 00 - Quality Requirements: Testing, inspection, and analysis requirements.

B. Perform tests on cement, aggregates, and mixes to ensure conformance with specified requirements.

C. Make rock available for inspection at producer's quarry prior to shipment. Notify Architect/Engineer at least seven days before inspection is allowed.

D. Allow witnessing of inspections and tests at manufacturer's test facility. Notify Architect/Engineer at least seven days before inspections and tests are scheduled.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify compacted subgrade is acceptable and ready to support devices and imposed loads.

C. Verify gradients and elevations of base or foundation for other work are correct.

3.2 SILT FENCE

A. Install in accordance SWPP and Standard Specifications and at locations shown on Drawings.

B. Use wire fence with Class A fabric.

C. Class B fabric may be used without woven wire backing subject to the following:

1. Fabric is approved by Architect/Engineer.
2. Maximum post spacing is 6 feet.
3. Posts are inclined toward runoff source not more than 20 degrees from vertical.

3.3 SITE STABILIZATION

A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.

B. Construct, stabilize, and activate erosion controls before site disturbance within tributary areas of those controls.

C. Stockpile and waste pile heights shall not exceed 35 feet. Slope stockpile sides at 2:1 or flatter.

D. Stabilize any disturbed area of affected erosion control devices on which activity has

ceased and which will remain exposed for more than 20 days.

1. During non-germinating periods, apply mulch at recommended rates.
2. Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Section 32 92 19 at 75 percent of permanent application rate with no topsoil.
3. Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with Section 32 92 19 permanent seeding specifications.

E. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

C. Perform laboratory material tests in accordance with ASTM D1557 or AASHTO T180.

D. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
2. Moisture Tests: ASTM D3017.

E. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

F. Frequency of Tests: Twice per lift for every 10,000 square feet.

3.5 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

B. When sediment accumulation in sedimentation structures has reached a point one-half depth of sediment structure or device, remove and dispose of sediment.

C. Do not damage structure or device during cleaning operations.

D. Do not permit sediment to erode into construction or site areas or natural waterways.

E. Clean channels when depth of sediment reaches approximately one-half channel depth.

END OF SECTION 312513

SECTION 323126 Fences and Gates

PART 1 GENERAL

1.01 DEFINITIONS

- A. AASHTO: American Association of State Highway and Transportation Officials
- B. ASTM: American Society for Testing and Materials

1.02 SYSTEM DESCRIPTION

- A. Design requirements in accordance with specification and type on documents.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Plan and sections of fence layout around emergency generator.
 - 2. Concrete footing layouts and sizes.
- B. Manufacturer's catalog information on woven wire, gates and posts.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials with manufacturer's tags and labels intact and legible.

1.05 PROJECT/SITE CONDITIONS

- A. Do not install fence until final grading complete and finish elevations established.

PART 2 PRODUCTS

- 2.01 See drawings for posts and fence componets – entire assembly and all accessories to be included.

2.05 GATES

- A. Gates: Swing type complete with latches, stops, keepers, hinges, and locks w/ keys as per documents.

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END OF SECTION 323126

SECTION 329200 Turf and Grasses

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. Section Includes:

1. Seeding.

B. Related Sections:

1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
2. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.
3. Division 32 Section "Plants" for border edgings.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban

environments, the surface soil can be subsoil.

1.4 SUBMITTALS

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

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

1.5 QUALITY ASSURANCE

A. Pre Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory.

C. installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods

with initial maintenance periods to provide required maintenance from date of Substantial Completion.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of Substantial Completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: State-certified seed of grass species as follows:

C. Seed Species: Seed of grass species as per drawings see landscape plans.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 (2.36-mm) sieve and a minimum of 75 percent passing through No. 60 (0.25-mm) sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. (2.4 kg/cu. m) of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. (4 kg/cu. m) of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

E. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

F. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

G. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.6 PESTICIDES - (Must meet NYS DEC & DEP approvals if used)

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.7 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch (75-mm) nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Invisible Structures, Inc.; Slopetame 2.
- b. Presto Products Company, a business of Alcoa; Geoweb.
- c. Tenax Corporation - USA; Tenweb.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

- A. Limit turf subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
1. Apply superphosphate fertilizer directly to subgrade before loosening.
 2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 3. Spread planting soil to a depth of 4 inches (100 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.
 - b. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least 6 inches (150 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.
 - a. Apply superphosphate fertilizer directly to surface soil before loosening.
 3. Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Turf Area Preparation" Article.
- B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 5 to 8 lb/1000 sq. ft. (2.3 to 3.6 kg/92.9 sq. m).

C. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. (38 to 49 L/92.9 sq. m). Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch, peat mulch, or planting soil within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch (4.8 mm), and roll surface smooth.

3.6 TURF RENOVATION

A. Renovate existing turf.

B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

- C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
- D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.
- E. Mow, dethatch, core aerate, and rake existing turf.
- F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).
- I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches (100 mm) of existing soil. Install new planting soil to fill low spots and meet finish grades.
- J. Apply seed and protect with straw mulch or sod, unless noted otherwise, as required for new turf.
- K. Water newly planted areas and keep moist until new turf is established.

3.7 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 2. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to turf area.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Engineer:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200